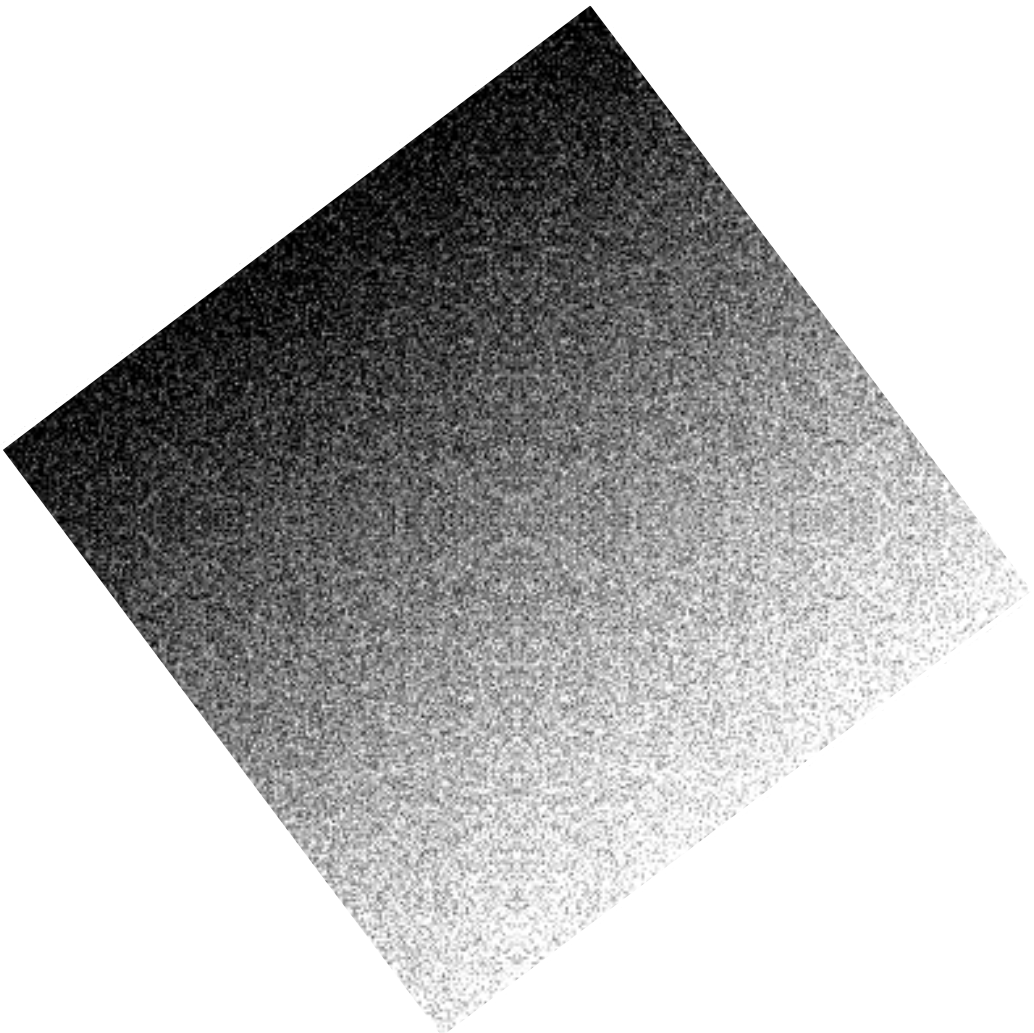
Intelligent Decision Server

IBM

Spreadsheet User's Guide

Version 1



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Intelligent Decision Server

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Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page vii.

First Edition (October 1996)

This edition applies to Version 1 of Intelligent Decision Server, 5639–IDS, and to any subsequent releases until otherwise indicated in new editions or technical newsletters. Make sure you are using the correct edition for the level of the product.

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About This Book

The IDS *Spreadsheet User's Guide* describes components, features, and functions of the Spreadsheet tool.

Who Should Read This Book

This book is intended for use by anyone who is using the Spreadsheet tool to create a spreadsheet to perform data analysis. This guide describes the tasks necessary to enter, calculate, and format data into a spreadsheet for electronic or print IDS distribution.

This book is written with the assumption that you have a working knowledge of IDS.

Prerequisite Reading

This book is designed to be used in coordination with the following IDS publications:

BASIC Tool User's Guide

Capsule User's Guide

Layout User's Guide

Plot User's Guide

Working with the Intelligent Decision Server

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Chapter 1. What Is Spreadsheet?

The IBM Intelligent Decision Server (IDS) Spreadsheet tool is an electronic version of the traditional accounting worksheet. Using the Spreadsheet tool, you can:

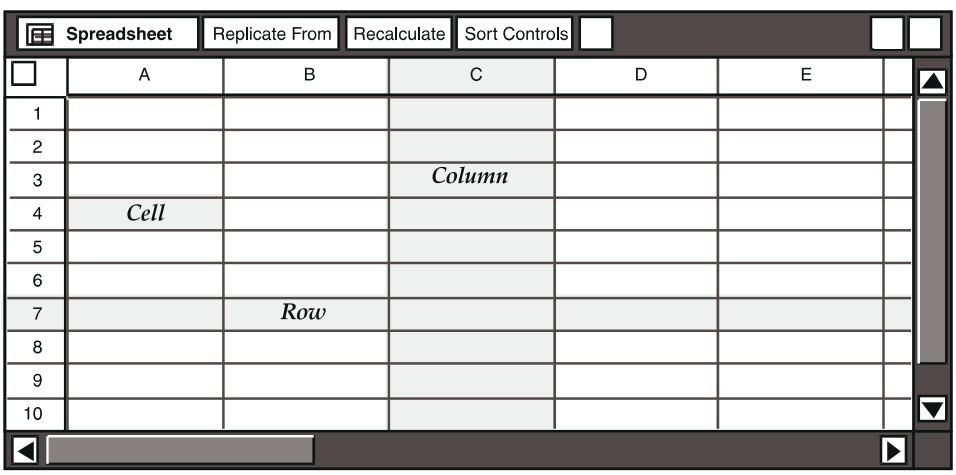
- Perform calculations and analyses, such as summing and cross-totaling trial balances
- Perform variance analyses and market studies
- Change any number or calculation and have your entire spreadsheet updated
- Schedule projects using the date functions to track work over time
- Design your spreadsheet to be included in presentations or written reports
- Select all or a portion of your spreadsheet and copy it directly into a Plot, Layout, Text, or Transformer tool

The following sections describe the spreadsheet elements and illustrate a sample completed spreadsheet.

The Spreadsheet Elements

The display area of the Spreadsheet window consists of lettered columns and numbered rows that form a grid of cells. Each column is labeled alphabetically from left to right, beginning with A to Z. After Z, columns are labeled AA to AZ, BA to BZ, and so on through ZA to ZZ. Rows are numbered from 1 through 4500.

The location of a cell is identified by a cell coordinate, which consists of a column label and row number. For example, the cell at the intersection of column A and row 4 is identified by the coordinate A4.



This is cell A4

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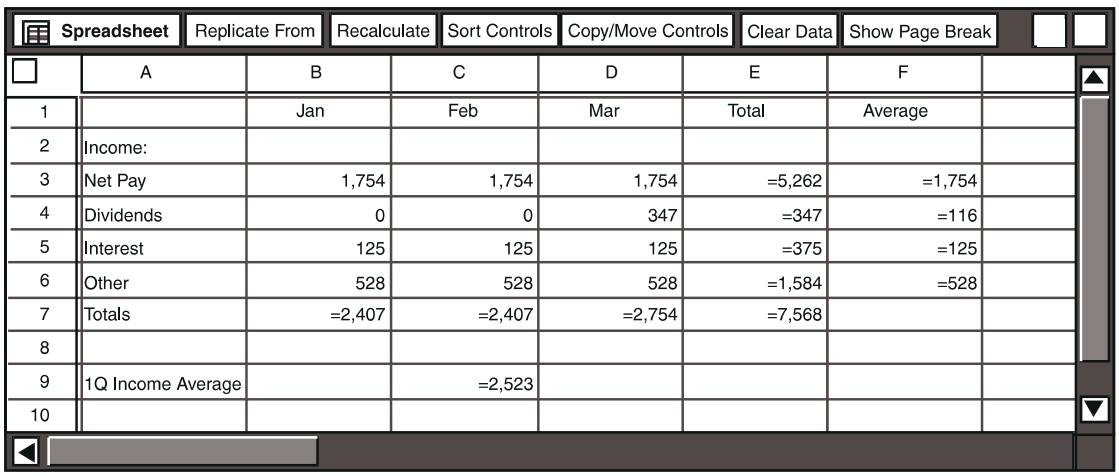
The Finished Spreadsheet

The following example shows a spreadsheet used to calculate income for the first quarter.



	A	B	C	D	E	F	
1		Jan	Feb	Mar	Total	Average	
2	Income:						
3	Net Pay	1,754	1,754	1,754	=5,262	=1,754	
4	Dividends	0	0	347	=347	=116	
5	Interest	125	125	125	=375	=125	
6	Other	528	528	528	=1,584	=528	
7	Totals	=2,407	=2,407	=2,754	=7,568		
8							
9	1Q Income Average		=2,523				
10							

Chapter 2. Getting Started

This chapter describes how to:

- Select the elements in the Spreadsheet window
- Move around in a spreadsheet
- Reposition a selection to the top of the Spreadsheet window
- Freeze row and columns so that they remain visible while you scroll the spreadsheet

Selecting Spreadsheet Elements

To manipulate information in a spreadsheet, you can select one of the following elements in the Spreadsheet window:

- A single cell
- Multiple cells (ranges)
- Rows, columns, or the entire spreadsheet

A spreadsheet can also have one or more regions. A region is a cell or range of cells to which a unique name has been assigned. For more information about selecting and working with regions, see Chapter 9, “Working with Regions” on page 52.

Selecting a Single Cell

Select the entire cell when you want to enter data directly into it or when you want to delete, copy, or move the cell contents. When you open an options window while an entire cell is selected, the Spreadsheet Options window opens with the Cell options displayed.

To select an entire cell:

1. Click on an edge of the cell. The entire cell is highlighted.

If you have trouble selecting a cell, point near its edge, then press and hold down the left mouse button, move the pointer into the cell, and then release the mouse button.

To edit the contents of a cell, create an insertion point in the cell as follows:

1. Click inside the cell. An insertion point (a blinking vertical bar) appears in the cell.

Selecting a Range of Cells

A rectangular block of cells is referred to as a range. A range is identified by a pair of cell coordinates separated by a colon. For example, B1:D4.

To select a range of cells:

1. Select the first cell in the range.

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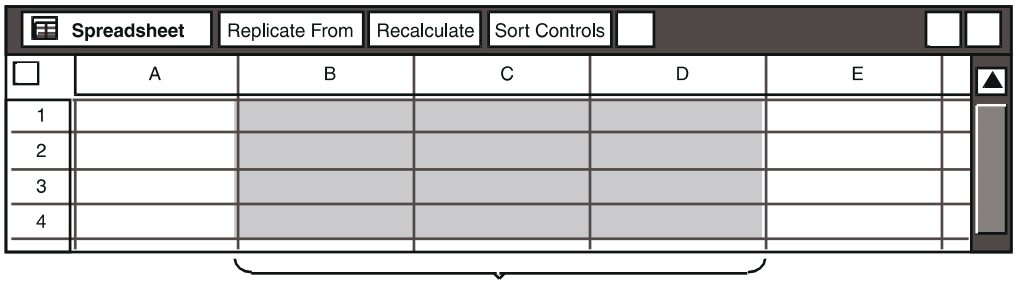
2. Using the right mouse button, select the last cell in the range.



Cell range B1:D4

Selecting Rows, Columns, or the Entire Spreadsheet

You can select one or more rows and columns.

To select a row or column:

1. Click on the row number or column label.

When you open the options window while a row or column is selected, the Row or Column options are displayed in the Spreadsheet Options window.

To select the entire spreadsheet:

1. Click on the Select All button in the upper-left corner of the Spreadsheet window.

All the columns and rows are selected.

When you open the options window while the entire spreadsheet is selected, the options that pertain to the entire spreadsheet are displayed in the Spreadsheet Options window.

Use the Select All button to copy or move spreadsheet data to another icon (such as a Layout or Plot icon), to set global options, or to clear or delete the entire spreadsheet contents.

Moving Around a Spreadsheet

You can move from a selected cell to another cell using the keyboard, as described in the following table.

To move	Press
One cell to the right	Tab
One cell to the left	Shift+Tab
One cell down	Enter

To move	Press
One cell up	Shift+Enter

When editing the contents of a cell, the Shift+Enter key combination produces a new line inside the cell. See “Entering Data Directly into a Cell” on page 9 for more information.

You can also use the arrow keys on your keyboard to move from cell to cell (when a cell is selected) in the direction of the arrow. If a cell is not selected, the arrow keys will move the cursor within the cell.

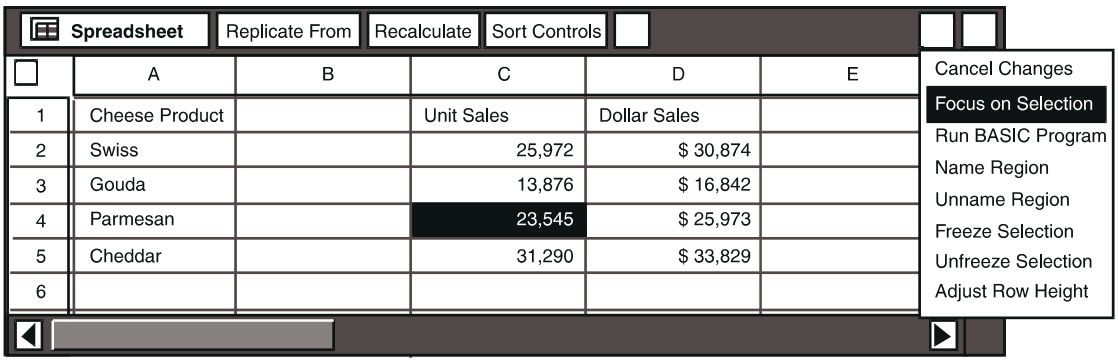
To scroll the spreadsheet window, use the scroll mechanisms on the scroll bars or the Home, End, Page Up, and Page Down keys.

Repositioning a Selection to the Top of the Window

When you want to reposition the information in the Spreadsheet window so that a particular element (such as a cell, row, or column) is displayed as the first element in the upper-left corner of the window, you can use the **Focus on Selection** choice in the Spreadsheet window's **Special** menu. Repositioning a selection does not change the coordinates of the spreadsheet cells.

To reposition a selection to the top of the window:

1. Select the appropriate spreadsheet element (such as a cell, row, or column).
2. From the **Special** menu, select **Focus on Selection**.



Freezing Rows and Columns

It is sometimes useful to freeze one or more rows or columns to keep them stationary while you scroll through the rest of the spreadsheet.

The following rules apply to freezing portions of the spreadsheet:

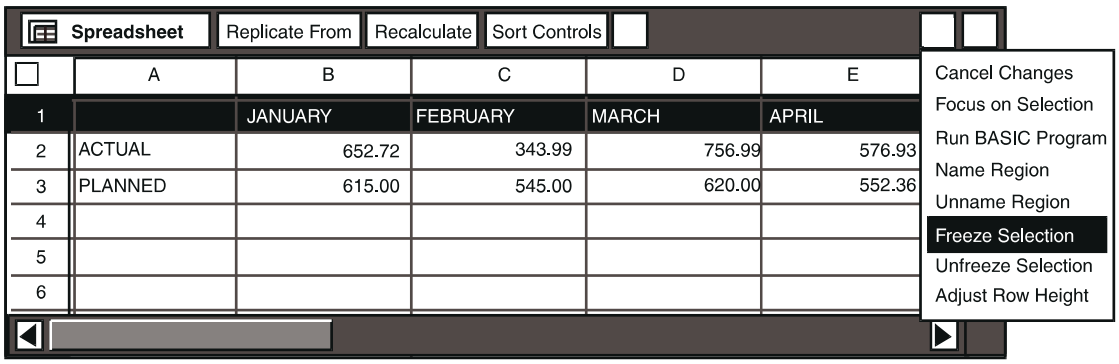
You can copy, move, format, and delete any spreadsheet element inside the frozen area.

When you enter a long string of text into a cell in a frozen area, the text does not expand into a non-frozen cell.

You cannot freeze individual cells.

To freeze a selection:

1. Select the rows or columns that you want to keep stationary.
2. From the **Special** menu, select **Freeze Selection**.



The frozen rows and columns shift to the upper-left corner of the display area and their row numbers and column labels are shaded.

	A	B	C	D
1		JANUARY	FEBRUARY	MARCH
2	ACTUAL	652.72	343.99	756.99
3	PLANNED	615.00	545.00	620.00

Expanding a Frozen Area

To expand a frozen area:

1. Select the frozen areas in the Spreadsheet window.
2. Use the right mouse button to select additional rows or columns that you want to freeze.
3. From the **Special** menu, select **Freeze Selection**.

   The frozen area expands to include the rows or columns that you selected.

Selecting Multiple Cells Within a Frozen Area

When you select a range that includes cells in a frozen area, you may inadvertently select cells that are not visible.

For example, suppose you freeze row 1 in the following spreadsheet.

	A	B	C	D
1	LAST	FIRST	DEPT NO	
2	curcin	jamie	1003	
3	graham	tanya	1002	
4	jones	ernest	1007	
5	maddox	otto	1007	

You scroll the spreadsheet until row 4 is beneath row 1, and select cells A1 and A4.

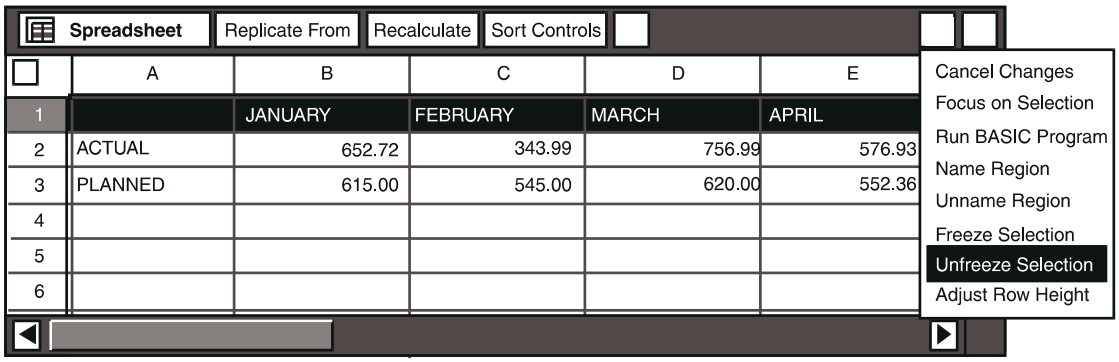
	A	B	C	D
1	LAST	FIRST	DEPT NO	
4	jones	ernest	1007	
5	maddox	otto	1007	
6	whitaker	leticia	1003	
7	wright	ruth	1002	

When you copy the selection to cell D4, four cells appear, because you actually selected the range A1:A4.

	A	B	C	D
1	LAST	FIRST	DEPT NO	
4	jones	ernest	1007	LAST
5	maddox	otto	1007	curcin
6	whitaker	leticia	1003	graham
7	wright	ruth	1002	jones

Unfreezing Rows and Columns

You can use **Unfreeze Selection** in the **Special** menu to unfreeze all frozen columns or rows, so that they move freely when you scroll through the spreadsheet. Columns and rows remain frozen even after you close and reopen the spreadsheet.



To unfreeze all frozen rows and columns:

1. Click on the **Select All** button.
2. From the **Special** menu, select **Unfreeze Selection**.

To unfreeze only a portion of the frozen area:

1. Select the first row or first column that you want to unfreeze.
2. From the **Special** menu, select **Unfreeze Selection**.

   The selected row and all rows beneath it are unfrozen; the selected column and all columns to the right of it are unfrozen. Rows above and columns to the left of the selection remain frozen.

Chapter 3. Entering Data

A cell can be classified as one of four types: formula, text, number, or date. The cell type determines how data is treated in calculations and other operations. By default, the cell type is formula.

This chapter describes the different cell types and how to enter:

Data directly into a cell

Data through the Spreadsheet Options window

Numbers

Text

Dates

Identifying Different Types of Cell Entries

By default, the cell type is formula. As you enter data into a cell, the contents of the cell are classified as one of three data types: number, text, or date. A formula cell type uses the data types in underlying operations to determine how to output formula results and the kind of formatting options for the cell.

The choices for cell types are found in the Spreadsheet Options window.

Cell types and examples are listed in the following table.

Type	Example
formula	sum(a1:a30)
number	1345.99
text	Chicago Sales
date	June 16, 1994

The following rules apply to cell types:

You can store only one data type in each cell.

The cell types are automatically set after you transfer data into the spreadsheet from other icons, either manually or in a capsule application.

Entering Data Directly into a Cell

You can enter data directly into a cell by selecting the cell, typing your entry, and then moving to another cell by pressing Shift + Tab to move to the left, Tab to move to the right, Enter to move down one cell, or clicking anywhere on your desktop. The Spreadsheet tool assigns a type to the cell depending on what you enter.

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If you enter this:	The cell type becomes:
a number in a valid number format	number
a backslash (\) followed by a date in a valid date format	date
an equal sign (**=**) or backslash (\) as the first character	formula
any other alphanumeric combination	text

When entering data directly into a cell, you can do the following:

Create a new line within a cell by pressing Shift+Enter.

Enter a tab within a cell by pressing Ctrl+Tab.

Entering Data Through the Spreadsheet Options Window

When you enter data through the Spreadsheet Options window, you do not use special characters in your entries to identify the cell type. Instead, you select the appropriate type in the **Type** field.

To enter data through the Spreadsheet Options window:

1. Select one or more cells and open the Spreadsheet Options window.
2. Select **Entry** in the **Display** field.
3. In the **Type** field, select the appropriate data type.
4. Enter the data into the **Entry** field. If you are entering a formula, select functions and operators from the choice buttons and use the help displayed in the window for guidance on syntax.

   You can enter cell references by selecting and copying the appropriate cells into the **Entry** field.
5. Click on Spreadsheet Options window.

For more information about entering formulas through the Spreadsheet Options window, see “Entering a Formula into Several Cells at Once” on page 23.

Entering Numbers

Important facts to remember when entering numbers:

To enter a number that includes a decimal or thousands separator, use the separator character specified in the Spreadsheet Options window. Although you can use any thousands separator when entering a range of numbers, the decimal separator must be the one that is specified in either the Set Preferences window or in the Spreadsheet Options window.

You can use any valid notation for negative numbers regardless of what is specified in the Spreadsheet Options window.

You cannot enter a symbol (such as $ or %) with a number. To use a symbol with a number, you must appropriately format the cell, as described in “Displaying Symbols with Numbers” on page 45.

A number that is too lengthy to fit in a cell is displayed in scientific notation or as a series of number signs (####), depending on the cell's numeric format. You can increase the column width to see the entire number as described in “Changing Column Width” on page 48.

By default, information in a cell has a general alignment: numbers are decimally aligned. However, you can change the cell alignment and the number format.

Empty numeric cells display zeros.

For information about changing number formats, see “Formatting Numbers” on page 42.

Entering Text

Important facts to remember when entering text:

You can enter a maximum of 4096 characters in a cell.

You can directly enter a number that you want treated as text by including a space before or after the number.

When you enter a long string of text into a cell, the entry scrolls in the cell. When you move to another cell or click anywhere on your desktop, the text expands into the cell to the right if that cell is empty. If that cell is not empty, you will not be able to see all of the text unless you:

- Change the column width
- Format the cell to wrap text
- Open the Spreadsheet Options window, where you can see all of the text displayed in the **Entry** field

By default, information in a cell has a general alignment: text and dates are left aligned in the cell unless you change the cell alignment.

An empty text cell displays a period.

For information about changing text formats, see “Formatting Text” on page 41.

Entering Dates

Important facts to remember when entering dates in a cell:

To enter a date directly into a cell, precede the entry with a backslash (\) and use a valid date format. If you enter a date incorrectly, an error value appears in the cell.

You can change the way a date is displayed in the Spreadsheet Options window **Date/Time Format** field, but when you click inside the cell to edit it, the displayed

date reverts to the format set in the Set Preferences window. As soon as you select another cell, the date is again displayed in your chosen format.

The Spreadsheet tool stores dates as numbers, beginning with the base date of January 1, 1970 as day 0. Dates can be used like numbers in calculations. For more information about using dates in formulas, see “Using Dates in Formulas” on page 26 and “Date and Time Functions” on page 84”.

You can enter the **today** function into a cell to display the current date. You can use this function to timestamp your spreadsheet. You must re-enter **today** whenever you want to display the current date. The **today** function is not updated automatically when the spreadsheet is recalculated.

For information about changing date and time formats, see “Formatting Dates and Times” on page 47.

Valid Date Formats

You can enter any of the date formats shown in the Set Preferences window with the following exceptions:

You cannot use a hyphen as a date separator unless it is selected as the date separator in the Set Preferences window.

You cannot use an ordinal number (for example, Jan 15th, 94).

You must use the date order specified in the Set Preferences window. For example, if MDY is specified, you can enter Dec 6, 93, but not 6 Dec 93. In addition, you can enter dates as shown in Table 1. Note that if you enter dates in a string format in function arguments (enclosed in quotes), it must be in the format show in Table 1.

Additionally:

A bimonth can be represented by two letters followed by the year. For example, am94 or AM1994.

A quarter can be represented by a digit, followed by an uppercase or lowercase Q, followed by the year (1q94, 1Q94).

Table 1. Acceptable date formats

Date type	Format
Day	January 15, 1989 Jan 15, 1989 jan 15, 89 jan 5 89
Month	January, 1989 Jan, 1989 january, 89 Jan, 89 jan 89
Year	1989 89
Odd-Bimonth	DJ, 1989 dj, 89
Even-Bimonth	JF, 1989 jf, 89
Quarter	1q89 1Q89

Including Time in a Date Entry

You can include time in a date entry when the date resolution is day.

To include time in a date entry:

1. After entering the date, type a space, and then the hour, minutes, and seconds, separating each with any of the valid time separators such as colon, period, comma, or hms (h after hours, m after minutes, and s after seconds). For example:

   14:3 :15

   14.3 .15

   14,3 ,15

   14h3 m15s

   Minutes and second are optional. If not entered, they do not appear.

2. If you are using a 12-hour clock, follow the date with a.m. or p.m.. For example:

   2:3 :15am

3. Make sure the hour format specified in the Spreadsheet Options window is set to the appropriate clock (12-hour or 24-hour).

You can change the format of the time, date, or both in the Spreadsheet Options window. See “Formatting Dates and Times” on page 47 for more information.

Time functionality is unique to the Spreadsheet tool. When transferring data between the Spreadsheet tool and another tool, all time entries are lost.

Chapter 4. Copying and Moving Data Within a Spreadsheet

You can copy or move any cells, columns, or rows to a new location in the Spreadsheet window. You can use the copy and move features to reorganize your spreadsheet and transfer data to other cells.

This chapter describes how to:

Set the **Copy**/**Move** controls

Copy and move cell contents

Copy and move columns and rows

Replicate cells

Move cells referenced in a formula

Setting the Copy/Move Controls

When you copy, move, or replicate spreadsheet information, all of the cell characteristics (values, formats, and formulas) are transferred to the new location unless you specify otherwise in the Copy/Move Controls window, shown in Figure 1.

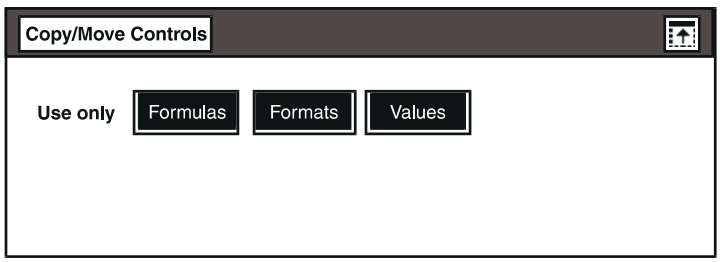

Figure 1. Copy/Move Controls window

To restrict what cell characteristics are copied or moved:

1. In the Spreadsheet window header, click on the Copy/Move Controls window appears.
2. Select the characteristics that you want to transfer. You can transfer formats only, values only, formats and values only, or formats and formulas only, as described in the following table.

Use this setting:	**To do this:**
Formulas/Values	Transfer formulas and the values that they calculate. For example, select **Formulas** if you want to copy a cell and transfer its formula so that you can edit the formula in the new location. Selecting **Formulas** automatically selects **Values**.

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Use this setting:	To do this:
Formats	Transfer only cell formats. For example, select **Formats** if you want to copy a cell and transfer its centered format but not its text content.
Values	Transfer only cell values. For example, select **Values** if you want to copy a cell and transfer its value, but you do not need to reproduce the formula in the new location.
Formats/Values	Transfer both the format and the value of a cell. For example, select **Formats** and **Values** if you want to copy a cell that contains a number displayed with four decimal places, and you want it to display with the same precision in its new location.

Important facts to remember when using the Copy/Move Controls window:

The settings apply to all transferred cells only while the Copy/Move Controls window is open.

The Copy/Move Controls window is associated only with the spreadsheet in which you open it, but the controls affect any information you transfer from that spreadsheet to another tool. See “Transferring Formats to Other Tools” on page 61 for more information.

Formulas can only be transferred to another Spreadsheet.

You cannot open two Copy/Move Controls windows at the same time.

Copying and Moving Cell Contents

To copy or move the contents of one or more cells:

1. Select the cell or range of cells whose contents you want to copy or move.
2. Activate the copy or move function.
3. Select the cell (or the first cell in a range) to which you want to copy or move the information.

   The contents of the copied or moved cells replace the contents of the cells in the new location.

Copying and Moving Columns and Rows

You can copy or move one or several consecutive columns or rows of data to a new location within the spreadsheet.

For example, you can rearrange the following spreadsheet so that the DOLLARS data in column C comes after the MONTHS data in column A.

	A	B	C
1	MONTHS	UNITS	DOLLARS
2	Jan 1994	645.00	6450.00
3	Feb 1994	= N/A	= N/A
4	Mar 1994	783.00	7830.00
5			

You would select column C, and move it by selecting column A as the destination. The data in column C is inserted after column A; column C becomes column B, and all subsequent columns are relabeled.

	A	B	C
1	MONTHS	DOLLARS	UNITS
2	Jan 1994	6450.00	645.00
3	Feb 1994	= N/A	= N/A
4	Mar 1994	7830.00	783.00
5			

As another example, you can rearrange the following spreadsheet so that the totals for the data appear above the individual product data.

	A	B	C
1	PRODUCT	UNITS	DOLLARS
2	Cola 12 oz	12000	174400.00
3	Cola 16 oz	11700	138000.00
4	TOTALS	23700	312400.00
5			

You would select row 4, and move it by selecting row 1 as the destination. The data in row 4 is inserted after row 1; row 4 becomes row 2, and all subsequent rows are relabeled.

	A	B	C
1	PRODUCT	UNITS	DOLLARS
2	TOTALS	23700	312400.00
3	Cola 12 oz	12000	174400.00
4	Cola 16 oz	11700	138000.00
5			

To copy or move a column or row:

1. Select one or more columns or rows you want to copy or move.
2. Activate the copy or move function.
3. Select as the destination the column or row after which you want to copy or move the selection.

To copy or move a column or row to the first position in the spreadsheet:

1. Copy or move the column to the first position.

   The column or row is placed after the first position.
2. Move the column or row that is in the first position to the second position.

   The column or row you selected in step 1 is now at the first position in the window.

Replicating Cells

Replication is the process of duplicating a formula from one cell to another cell or to a range of cells. Although normally used to duplicate cells containing formulas, replication can also be used to duplicate cells containing other types of data, such as numbers or text. When you replicate a cell that contains relative cell references, the cell coordinates adjust to the new location.

To replicate a cell:

1. Select a cell or range of cells as the destination for the replicated information.
2. In the Spreadsheet window header, click on **Replicate From**.
3. Select the cell that contains the information you want to replicate.

   The information in the source cell is replicated in the cells you selected.

For example, to replicate the information in cell A3, you would select the cells B3 and C3 as the destination cells.

You would then click on **Replicate From** and select cell A3 as the source cell. Information in cell A3 is replicated in cells B3 and C3.

Moving Cells Referenced in a Formula

When you move a cell, column, or row that is referenced by a formula in another cell, including moving rows and columns by inserting other rows and columns, both relative and absolute cell references adjust appropriately so that the results of the formula remain the same.

For example, the following spreadsheet shows a formula that references cells A1, B2, and C3.

	A	B	C	D
1	1	5	2	
2	2	6	3	
3	3	7	4	
4				=a1 + b2 + !c!3
5				

When you move row 2 to row 4, as shown in the following spreadsheet, the cell coordinates are updated so that the same values are still referenced in the formula.

	A	B	C	D
1	1	5	2	
2	3	7	4	
3				=a1 + b4 + !c!2
4	2	6	3	
5				

Moving a Single Cell Within a Referenced Range of Cells

When you move a cell whose coordinates are referenced as part of a range of cells in a formula, the cell coordinates update to the new location. A range is defined by the beginning and ending coordinates of the cell range. Therefore, the results of a formula depend on the location of the referenced cells. The following examples illustrate how cell coordinates for ranges are updated.

The following spreadsheet contains a formula in cell D4 that references cells A1 through C3. The results of the formula are shown in the spreadsheet on the right.

	A	B	C	D
1	1	5	2	
2	2	6	3	
3	3	7	4	
4				=sum(a1:c3)
5				

	A	B	C	D
1	1	5	2	
2	2	6	3	
3	3	7	4	
4				=33
5				

If you move the first cell in the range (A1) to cell C4, the cell coordinates change to reference cell C4. The results of the updated formula are shown in the spreadsheet on the right.

	A	B	C	D
1		5	2	
2	2	6	3	
3	3	7	4	
4			1	=sum(c4:c3)
5				

	A	B	C	D
1		5	2	
2	2	6	3	
3	3	7	4	
4			1	=5
5				

Chapter 5. Working with Formulas

A formula is an equation that produces a new value from existing values. For example, if you wanted to compute the sum of rows 2 through 8 in column B, you could enter the following formula directly into the appropriate cell, and then move to another cell to see the result:

```
=sum(B2:B8)
```

The above formula consists of a function (**sum**) followed in parentheses by the location of the data to be acted upon.

This chapter describes how to:

- Use operators
- Use absolute and relative cell references
- Enter a formula into several cells at once
- Use functions in formulas
- Get help for functions
- Use ranges and regions in formulas
- Use dates and strings in formulas

You can duplicate an existing formula in another cell or region in your spreadsheet by either replicating or copying it. The end result of replicating and copying is the same. For more information see “Replicating Cells” on page 17 and “Copying and Moving Cell Contents” on page 15 .

Using Operators

You can build formulas by combining operators (such as +, -, *, and /) with values to produce a new value in the cell containing the formula. For example, in the formula C5*2, the value in cell C5 is multiplied by 2.

If you use more than one operator in a formula, the order of calculations is based on the precedence level assigned to each operator. For example, multiplication takes precedence over addition. Thus, the formula 1+2*3 results in 7, not 9.

You can override operator precedence by placing part of a formula in parentheses. For example, (1+2)*3 results in 9 because expressions in parentheses are evaluated first.

To build formulas that produce the desired results, you need to understand the order in which the Spreadsheet tool calculates formulas. Use this table for guidance.

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Operator	Description	Precedence in descending order
^	Exponentiation	Evaluated first
*, /	Multiplication, division	Evaluated second
+, -	Addition, subtraction	Evaluated third
=, not =, > =, < =, >, <	Relational operators	Evaluated fourth
and, not, or	Logical operators	Evaluated last

Remember that expressions within parentheses are evaluated first. Except for exponentiation, operators with equal precedence are evaluated from left to right. For example, addition is performed before subtraction.

The Spreadsheet tool uses the following arithmetic, relational, and logical operators:

Arithmetic operators: + (addition), - (subtraction), * (multiplication), / (division), (exponentiation).

Relational operators: =(equal), not= (not equal), > (greater than), < (less than), >= (greater than or equal to), <= (less than or equal to).

Logical operators: and, not, or.

Operators are located in the **Operators** menu. Table 2 lists the relational and logical operators in the **Operators** menu and provides syntax examples and brief descriptions.

Table 2 (Page 1 of 2). Operators

Operator	Example	Description
=	5=0	A relational operator that returns **True** if the arguments are equal; otherwise returns **False**.
<=	3<=b6	A relational operator that returns **True** if the value of the argument on the left side is less than or equal to the value of the argument on the right side; otherwise returns **False**.
>=	b12>=d4	A relational operator that returns **True** if the value of the argument on the left side is greater than or equal to the value of the argument on the right side; otherwise returns **False**.
<	a1<a2	A relational operator that returns **True** if the value of the argument on the left side is less than the value of the argument on the right side; otherwise returns **False**.

Table 2 (Page 2 of 2). Operators

Operator	Example	Description
>	a7>10	A relational operator that returns **True** if the value of the argument on the left side is greater than the value of the argument on the right side; otherwise returns **False**.
and	(c1+c2)<(b1+b2)and(e1+e2)<(f1+f2)	A logical operator that returns **True** if both arguments in the statement are true and **False** if either argument in the statement is false.
not	not(c1>c2)	A logical operator that returns **True** if the argument is false and **False** if the argument is true.
not=	5not=0	A relational operator that returns **True** if the arguments are not equal; otherwise returns **False**.
or	(c1+c2)<(b1+b2)or(e1+e2)<(f1+f2)	A logical operator that returns **True** if either argument in the statement is true and **False** if both arguments in the statement are false.
if	if(7=a2,1,2) returns 1 if cell a2 equals 7, otherwise it returns 2	Constructs conditional formulas that resolve to one of two values, determined by whether the results of the arguments are true or false.
true	if(8<10true,false)	In an **if** statement, returns the value **True**.
false	if(8>10true,false)	In an **if** statement, returns the value **False**.
set@	set@A=2 (enters 2 for @-variable A)	Sets the specified @-variable to the value entered, or to the value of the specified cell, formula, range, or region.
na	if(b3=b7,na,10)	Can be used with **if** function as one of the values in the conditional statement or as a result of the function, which returns an **N/A** value.
error	if(b3=error,0,1)	Can be used with **if** function as one of the values in the conditional statement or as a result of the function, which returns an error value.

Relative Versus Absolute Cell References

When you copy or replicate cells containing formulas, the Spreadsheet tool automatically updates the formulas to reference new cell positions. This is very helpful when you want to duplicate parts of a spreadsheet. There are two kinds of cell references:

A relative cell reference changes when the cell containing the reference is copied or moved.

An absolute cell reference always refers to the original cell, regardless of where you copy or replicate the formula. An absolute cell reference is identified by a preceding exclamation point.

When you move cells containing formulas, relative cell references are not updated.

This section describes the difference between relative and absolute cell references.

Relative Cell References

By default, cell references in a formula are relative. That is, the Spreadsheet tool locates the cell reference by its position in relation to the cell containing the formula, not to the original location of the cell in which you entered the formula.

For example, the following spreadsheet totals the first and second quarter figures for two territories. If you enter the formula sum(B2:B3) in cell B4 and then copy this formula to cell C4, the formula is adjusted to add the values in cells C2 through C3. Similarly, if you delete or add columns or rows that change the location of the original cell, the formula adjusts to its new location.

	A	B	C
1		Eastern	Western
2	1Q94	197.3	176.5
3	2Q94	198.7	187.7
4	TOTALS	=sum(B2:B3)	=sum(C2:C3)
5			

Absolute Cell References

To prevent a cell reference from adjusting when you copy or replicate a formula, you can make the cell reference absolute by placing an exclamation point (!) before the column label, row number, or both. An absolute cell reference refers to the original cell, regardless of where you copy or replicate the formula.

For example, if you enter the formula sum(!B!2:B3) in cell B4 and then copy this formula to cell C4, the reference to cell B2 does not change.

Entering a Formula into Several Cells at Once

Using the Spreadsheet Options window, you can enter a formula into several adjacent cells at the same time. If the formula contains relative references, the cell coordinates in the formula are automatically adjusted to refer to cells relative to the new location.

To enter a formula into several cells at the same time:

1. Select the range of cells into which you want to enter the formula and open the options window.

2. In the **Display** field, select **Entry**.
3. In the **Type** field, select **Formula**.
4. In the **Entry** field, enter the formula.
5. Click on Spreadsheet Options window.

For example, if you select cells A3 through C3 and enter the formula sum(A1:A2) in the **Entry** field, the formula is adjusted for each column, as shown in the following spreadsheet.

	A	B	C
1	32	44	67
2	45	39	56
3	=sum(A1:A2)	=sum(B1:B2)	=sum(C1:C2)
4			
5			

If you select the same cells and enter the formula sum(!A!1:A2) in the **Entry** field, the formula is adjusted as shown in the following spreadsheet.

	A	B	C
1	32	44	67
2	45	39	56
3	=sum(!A!1:A2)	=sum(!A!1:B2)	=sum(!A!1:C2)
4			
5			

Note that now, the formula in cell B3 now sums four cells (A1+A2+B1+B2) and the formula in cell C3 now sums six cells (A1+A2+B1+B2+C1+C2).

Using Functions in Formulas

A function usually consists of two parts: the function name (such as sum) and the function's arguments (the values to be operated on). Use the following guidelines to format and arrange these parts in a specific way.

Use lowercase letters for function names.

Place parentheses around the arguments. Use commas followed by a space to separate multiple arguments. For example, sum(A1:A4, B1).

Enclose text in quotation marks.

To avoid errors, use the Spreadsheet Options window to enter functions. This entry method enables you to select function names from menus and use the syntax help displayed in the window for guidance. For more information, see the section “Entering Data Through the Spreadsheet Options Window” on page 10.

Appendix A, “Functions” on page 65, contains function descriptions, syntax, and examples.

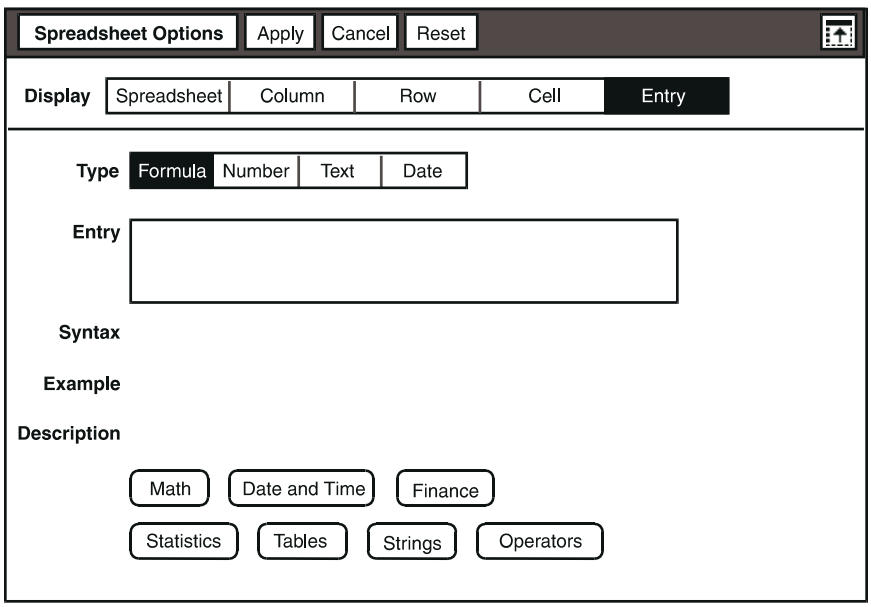
Getting Help Using Functions

When you enter a formula directly into a cell, you must precede it with an equal sign (=). However, it is usually more efficient to enter formulas through the Spreadsheet Options window, which provides syntax help. Descriptive text appears in the **Syntax**, **Example**, and **Description** fields.

You can scan the function menus without entering a function into the **Entry** field. Scanning is useful when you are not sure which function is appropriate for the result you are trying to obtain.

To scan the function menus:

1. Open the Spreadsheet Options window and select **Entry** as the **Display** option.



2. Point to a function-category button, then hold down the left mouse button and drag the pointer through the menu.

   As you move through the menu, the help information in the **Syntax**, **Example**, and **Description** fields changes for each function.

3. To freeze the help information for a particular function, drag the pointer out of the menu to a blank area in the window, then release the mouse button.

   The information in the read-only fields remains displayed, allowing you to study the syntax, examples, and description of the function.

You cannot close the Spreadsheet Options window until the entry has the correct syntax. If part of the formula is incorrect, the spreadsheet highlights the error and displays an error message in the desktop message bar.

For example, to enter the formula sum(d4:d9):

1. In the Spreadsheet Options window, select the **sum** choice in the **Statistics** menu.
2. In the spreadsheet, select the range of cells from D4 through D9, and copy them after the left parenthesis in the **Entry** field.

   The cell range coordinates, D4:D9, appear after the left parenthesis.
3. Type the right parenthesis to complete the formula.
4. Close the Spreadsheet Options window.

Using Ranges and Regions in Formulas

You can use ranges and regions in formulas only as arguments of functions. The name of the region must be placed in square brackets. References to the region name are case sensitive.

For example, the following formula returns the minimum value from cell A1, cell range B3 through D10, and all of the cells in the region named **Unit Sales**:

min(A1, B3:D1 , [Unit Sales])

Acceptable syntax for ranges and regions in formulas are shown in the following table.

Acceptable	Not acceptable
sum([Sales])+100	[Sales]+100
sum(D3:D10)+100	(D3:D10)+100

For more information about regions, see Chapter 9, “Working with Regions” on page 52.

Using Dates in Formulas

You can build formulas that perform date arithmetic as shown in the following table, which shows the results of adding different time periods to the date June 1, 1994.

Date with certain resolution	If formula in cell is	The resolution is
June 1, 1994 11:00:00	a1+1 second	June 1, 1994 1:00:01

Date with certain resolution	If formula in cell is	The resolution is
June 1, 1994 11:00	a3+1 minute	June 1, 1994 11:01
June 1, 1994 11:00	a5+1 hour	June 1, 1994 12:00
June 1, 1994	a7+1 day	June 2, 1994
June 1, 1994	a9+1 week	June 8, 1994
June 1, 1994	a11+1 qweek	June 29, 1994
June, 1994 June 1, 1994	a13+1 month a14+1 month	July, 1994 July, 1994
JF, 1994 June 1, 1994	a16+1 bimonth a17+1 bimonth	MA, 1994 August 1, 1994
1Q1994 June 1, 1994	a19+1 quarter a20+1 quarter	2Q1994 September 1, 1994
1994 June 1, 1994	a1+1 year a23+1 year	1995 June 1, 1995

Important facts to remember about date arithmetic:

If you do not specify a date period in a formula, the result is based on the date's precision.

For example, if you add the number 1 to the date June, 1994, the result is July, 1994, since the date is precise to the month; if you add the number 1 to the date June 28, 1994, the result is June 29, 1994, since the date is precise to the day.

Make sure that a cell you are referencing in a formula contains a date. When a cell contains a text entry, its value is 0. For example, if you add the number 1 to the string July, 1993, the result is 1.

The resolution of the resulting date depends upon the resolution of the date.

For more information about how to enter dates, see “Entering Dates” on page 11. For more information about the date and time functions available in the Spreadsheet tool, see “Date and Time Functions” on page 84.

Using Strings in Formulas

When you use text strings in formulas, you must place them between double quotation marks. There are several string functions that you can use in your formulas.

Suppose, for example, that cell A2 contains the name of a city (Chicago) and cell B2 contains the abbreviation for a state (IL). The following formula would result in the value Chicago, IL:

```
concat(A2, ',', B2)
```

For more information about the string functions available in the Spreadsheet tool, see “Date and Time Functions” on page 84.

Chapter 6. Setting Calculation Options

You can set fields that affect the way the spreadsheet performs calculations.

This chapter describes how to:

Set recalculations to occur automatically or manually

Change the recalculation order

Perform calculations until a specific condition is met

Use either the full or displayed number precision in calculations

Ignore error values, N/A values, or both in aggregate calculations

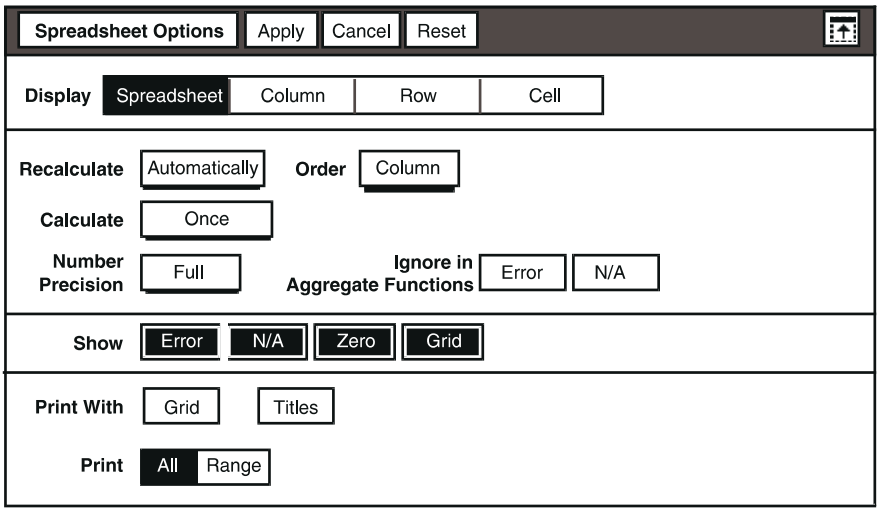
Stop calculations

To display options for the entire spreadsheet:

1. Click on the Select All button in the Spreadsheet Options window.

   If the Spreadsheet Options window is already open, select **Spreadsheet** in the **Display** field.

Use these fields to set calculation options for the spreadsheet.



Setting Recalculations to Occur Automatically or Manually

You can have recalculations occur automatically whenever a change is made, or manually when you click on the **Recalculate** button in the window header. By default, recalculations occur automatically.

To perform recalculations manually:

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1. Click on the Select All button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Recalculate** field, select **Manually**.
3. Click on the Spreadsheet window header.
4. Click on Spreadsheet Options window.

External references are not updated unless you select the **Reread External Values** choice from the Special menu, or close and reopen the spreadsheet. For more information, see “Reading Data from Other Spreadsheets” on page 61.

Changing the Recalculation Order

By default, the Spreadsheet tool recalculates formulas column by column, from left to right. You can change this order so that recalculations are performed row by row.

For example, the following spreadsheet calculates income for the first quarter of the year. The formula in cell C9 depends on the result of the calculation in cell E7. By default, the Spreadsheet tool recalculates the formula in cell C9 before it recalculates the formula in cell E7, and does not produce the correct results.

	A	B	C	D	E	F	
1		Jan	Feb	Mar	Total	Average	
2	Income:						
3	Net Pay	1,754	1,754	1,754	=5,262	=E3/3	
4	Dividends	0	0	347	=347	=E4/3	
5	Interest	125	125	125	=375	=E5/3	
6	Other	528	528	528	=1,584	=E6/3	
7	Totals	=sum(B3:B6)	=sum(C3:C6)	=sum(D3:D6)	=sum(E3:E6)		
8							
9	1Q Income Average		=E7/3				
10							

You would set the Spreadsheet tool to recalculate by row so that it recalculates the formula in cell E7 before the formula in cell C9 to produce the correct results.

	A	B	C	D	E	F	
1		Jan	Feb	Mar	Total	Average	
2	Income:						
3	Net Pay	1,754	1,754	1,754	=5,262	=1,754	
4	Dividends	0	0	347	=347	=116	
5	Interest	125	125	125	=375	=125	
6	Other	528	528	528	=1,584	=528	
7	Totals	=2,407	=2,407	=2,754	=7,568		
8							
9	1Q Income Average		=2,523				
10							

To set the recalculation order in a spreadsheet:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Order** field, select either **Row** or **Column**.
3. Click on Spreadsheet Options window.

Performing Calculations Until a Specific Condition Is Met

By default, the Spreadsheet tool preforms calculations only once. However, you can set it to perform calculations repeatedly until one of two conditions is met: either the change in results from one pass to the next is less than or equal to a specified maximum value, or a specified maximum number of recalculations has been performed.

To set the Spreadsheet tool to recalculate to a specific value or for a specific number of times:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Calculate** field, select **To Specified Value**. Two new fields appear.

3. In the **Maximum Change** field, enter the maximum change between iterations.
4. In the **Maximum Iterations** field, enter the maximum number of recalculations.
5. Click on Spreadsheet Options window.

For example, with the above setting, if you are calculating amounts in dollars and cents and have forward or circular references within your spreadsheet, the spreadsheet calculates repeatedly, because a change that is less than one cent ($0.01) is insignificant. You would enter .1 in the **Maximum Change** field, then enter 1 for the number of

times the spreadsheet recalculates. If the calculations do not reach the required value of a change of less than 0.01 within 10 recalculations, the process stops.

Performing Calculations with Full or Displayed Precision

You can specify that calculations be performed based on either the full value that you entered in the spreadsheet, or the displayed value. By default, full precision is used for calculations.

To calculate using displayed number precision:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Number Precision** field, select **Displayed**.
3. Click on Spreadsheet Options window.

For more information about displaying numbers in a spreadsheet with a specified number of decimal places, see “Setting the Displayed Precision” on page 43.

Ignoring Error and N/A Values in Aggregate Functions

When the Spreadsheet tool performs calculations, it handles non-numeric values as follows:

If an error is encountered, the value **Error** is returned.

If an N/A value is encountered, the value **N/A** is returned.

If a cell type mismatch is encountered during a calculation, all functions except count return an error.

Empty cells are ignored.

You can set the Spreadsheet tool to ignore error values, N/A values, or both when it performs calculations with aggregate functions (average, concat, fract, max, median, min, mod, mode, round, std dev, sum, and variance).

For example, suppose you have the following spreadsheet that calculates sales of four bakery products for the first quarter of the year. The March figures are not yet available for the bagel sales, so the sum of the first quarter sales for bagels is N/A.

	A	B	C	D	E
1	Product Name	January	February	March	1Q Totals
2	Bagel	2750	3000	=N/A	=N/A
3	Muffin	1680	1570	1860	=5,110
4	Croissant	3450	3760	4070	=11,280
5	Donut	1260	1090	1400	=3,750

You would set the spreadsheet to ignore N/A values, so that it returns a total for the two available months of data, as shown in cell E2 in the following spreadsheet.

	A	B	C	D	E
1	Product Name	January	February	March	1Q Totals
2	Bagel	2750	3000	=N/A	=5,750
3	Muffin	1680	1570	1860	=5,110
4	Croissant	3450	3760	4070	=11,280
5	Donut	1260	1090	1400	=3,750

To have error and N/A values ignored in aggregate functions:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Ignore In Aggregate Functions** field, specify the values that you want the spreadsheet to ignore by clicking on the appropriate button to highlight it.

   When you select **Error**, non-numeric values such as dates and text are also ignored.
3. Click on Spreadsheet Options window.

You can also prevent N/A and error values from being displayed on the screen and printed. For more information about error and N/A values, see “Hiding Error, N/A, and Zero Values” on page 50.

Stopping a Calculation

Press the stop key to stop a calculation at any time.

Cells that were calculated before you stopped the calculation are not reset to their original values. You should recalculate the entire spreadsheet to ensure that all formulas have correct results.

Chapter 7. Editing Spreadsheets

When you edit a spreadsheet, you can edit the information in a cell and insert blank columns and rows. You can also sort information to make it easier to locate and view in a large spreadsheet.

This chapter describes how to:

Edit the information in a cell

Cancel changes

Insert a blank column or row

Clear and delete information

Protect cells

Sort information in a spreadsheet

Editing Information in a Cell

You can select the contents of a cell and edit one or more characters.

To edit the information in a cell:

1. Click in the cell to create an insertion point and then edit the text the same way you would edit text in any IDS tool.

When you click in a date or number cell, the date or number reverts to the format set in the Set Preferences window.

Alternatively, you can select the entire cell, and then:

Press Delete or Backspace to delete all the information.

Begin typing to replace the information in the cell. If you change your mind, immediately press Esc to restore previous text.

You can edit an entry that exceeds the column width by placing the cursor inside the cell and using the arrow keys to move around, or:

1. Select the cell and open the options window.
2. In the options window, select **Entry** in the **Display** field.
3. Edit the entry in the **Entry** field.

Canceling Changes

The **Cancel Changes** choice in the **Special** menu allows you to cancel changes made to a spreadsheet, including changes applied in the Spreadsheet Options window.

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You cannot use **Cancel Changes** to restore the window to its previous state if you saved changes to your spreadsheet by closing the Spreadsheet window. Once you close the Spreadsheet window, the changes are set.

To restore the spreadsheet to its state at the last time you closed it:

1. Select **Cancel Changes**.

The Spreadsheet window closes, and the spreadsheet reverts to the last saved version.

If you select **Cancel Changes** and you have not saved changes to the spreadsheet by closing the Spreadsheet window, the new version is placed in the Discard icon.

Inserting a Blank Column or Row

You can copy or move blank columns or rows to create more space for additional data or to change the appearance of your spreadsheet.

For example, you can rearrange the following spreadsheet so that a blank row follows the column headings in row 1.

	A	B	C	
1	MONTHS	DOLLARS	UNITS	
2	Jan 1994	6450.00	645.00	
3	Feb 1994	=N/A	=N/A	
4				

You would insert row 4 beneath row 1 by selecting row 4, activating the copy or move function, and then selecting row 1 as the destination. Row 4 is inserted below row 1 and relabeled as row 2. All subsequent rows are relabeled.

	A	B	C	
1	MONTHS	DOLLARS	UNITS	
2				
3	Jan 1994	6450.00	645.00	
4	Feb 1994	=N/A	=N/A	

To insert a blank column or row:

1. Select any blank column or row.
2. Activate the copy or move function.
3. Select as the destination the column or row immediately preceding the desired column or row location.

The blank column or row is inserted in the spreadsheet.

When you insert a blank column or row into a region, the size of the region expands. For more information about adding columns and rows to regions, see “Changing the Size of a Region” on page 54.

Clearing and Deleting Information

Clearing and deleting are two ways to remove data from a spreadsheet.

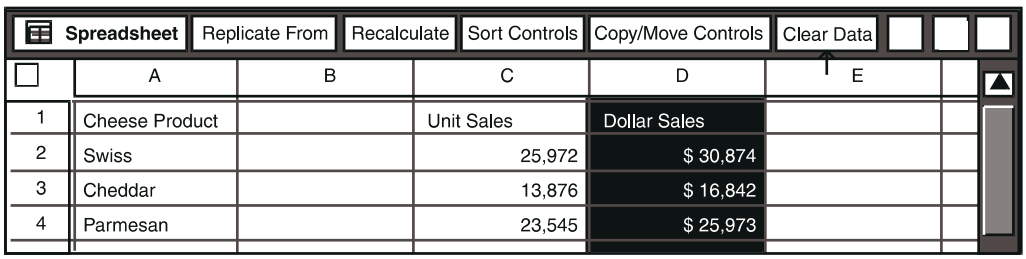
Clearing removes cell data, but preserves format settings and leaves cleared column and rows in place. When you clear a data or formula from a cell, the cell type changes to number, and zeros appear in the cell. All non-formula type characters change into a period. You cannot clear data from a protected cell.

For example, if you want to change the name of a centered column heading, but want the new name to remain centered, you would use the **Clear Data** button to remove the contents from the cell.

Deleting rows or columns removes both data and formatting from cells and completely removes selected columns and rows from the spreadsheet. The remaining columns and row move to close up the space left by the deletion, with relevant formulas updated accordingly.

To clear data from a spreadsheet:

1. Select the portion of the spreadsheet that you want to clear, then click on the **Clear Data** button in the Spreadsheet window header.



To delete data from a spreadsheet:

1. Select the portion of the spreadsheet you want to delete, then press the Delete key or activate the delete function in the pop-up function pad.

If you inadvertently clear data from your spreadsheet and you have not closed the Spreadsheet icon, you can recover your data by selecting **Cancel Changes** in the **Special** menu. When you select **Cancel Changes**, the Spreadsheet icon closes, and a copy of the edited version of the spreadsheet is placed in the Discard icon.

Protecting the Contents of a Cell

You can protect the contents of a cell so that the contents cannot be edited directly or cleared inadvertently.

Protecting a cell does not prevent the cell from being copied, moved, deleted, or having its format settings changed. Deleting a column or row that contains a protected cell removes the cell and its contents.

To protect a cell so that the contents of the cell cannot be edited directly or cleared:

1. In the **Protection** field, select **On**.
2. Click on Spreadsheet Options window.

You can edit the contents of a protected cell by entering data into the Spreadsheet Options window.

When you move a protected cell, the cell is still protected. When you copy or move the contents of an unprotected cell to a protected cell, the protection for a cell is set to Off.

Sorting Information

You can reorganize the information in a spreadsheet alphabetically and numerically by using the sort controls. You can sort up to five levels of information. For example, you can alphabetize entries in a column containing names, and then sort them chronologically or by department number.

You can sort columns in ascending or descending order. Columns are automatically sorted in ascending order: numbers are sorted from smallest to largest; text from A to Z; and dates from past to present. In ascending order, empty cells are sorted to the bottom of a column.

To sort spreadsheet information:

1. Select the column, row, or range of cells that you want to sort.
2. Click on the Spreadsheet window header.

   The Sort Controls window appears, as shown in Figure 2 on page 37. The coordinates of the selected cells are highlighted in the **Coordinates** field. By default, the first column in the cell range appears in the **Column** field for the first sort level.

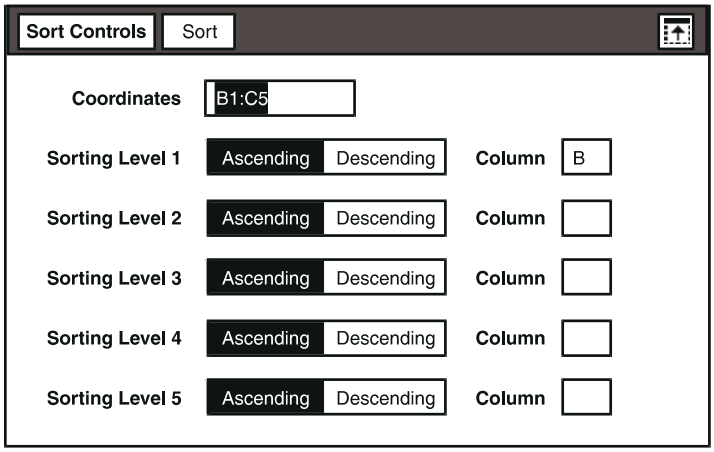


Figure 2. Sort Controls window

3. Enter a column label for each sorting level you want to use.
4. Select **Ascending** or **Descending** as the sort order for each sort level you specify.
5. Click on Sort Controls window header.

   To cancel the procedure, close the Sort Controls window without clicking on the **Sort** button.

Important facts to remember about sorting data:

You can type or copy the coordinates of the cells that you want to sort into the Sort Controls window.

Be sure to specify the entire range of data in the **Coordinates** field so that corresponding data remains together.

When you select a column or row to sort, you may need to edit the coordinates in the Sort Controls window so that column and row headings are not sorted.

Suppose you have the following spreadsheet listing employee names, department numbers, and hire dates.

	A	B	C	D
1	LAST	FIRST	DEPT NO	HIRE DATE
2	norton	richard	1003	11/15/88
3	curcin	alex	1002	06/13/92
4	wright	ruth	1007	09/17/90
5	curcin	jamie	1007	05/05/89

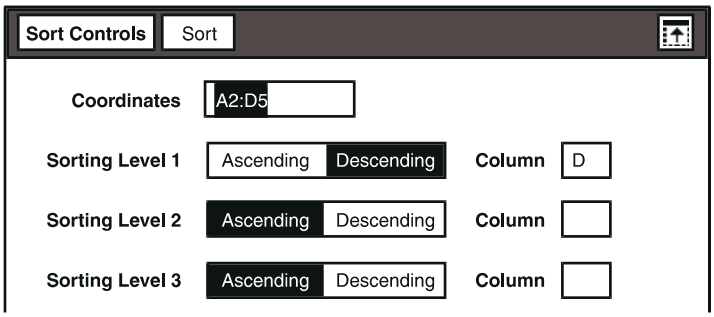
To sort the data alphabetically by employee name, you would select the cell range A2:D5 to sort all of the corresponding information for each employee without the

column headings. You would use column A as the first sort level and column B as the second sort level, because two people have the last name Curcin.

The following spreadsheet shows the data as it appears after sorting.

	A	B	C	D
1	LAST	FIRST	DEPT NO	HIRE DATE
2	curcin	alex	1002	06/13/92
3	curcin	jamie	1007	05/05/89
4	norton	richard	1003	11/15/88
5	wright	ruth	1007	09/17/90

Suppose you want to sort the employees by hire date, with the newest employee at the top of the spreadsheet. You would use column D as the first sorting level and change the sort type to descending, as shown in the following illustration.



The following spreadsheet shows the data as it appears after sorting.

	A	B	C	D
1	LAST	FIRST	DEPT NO	HIRE DATE
2	curcin	alex	1002	06/13/92
3	wright	ruth	1007	09/17/90
4	curcin	jamie	1007	05/05/89
5	norton	richard	1003	11/15/88

Chapter 8. Formatting a Spreadsheet

You can use the Spreadsheet Options window to change formats for font typeface, numbers, and dates and times in a spreadsheet. You can also display formula rules, align information in a cell, and hide error, N/A, and zero values, as well as the grid in the Spreadsheet window.

This chapter describes how to:

- Display formula rules versus results
- Align information in a cell
- Format text
- Format numbers
- Format dates and times
- Change column width
- Change row height
- Hide grid lines
- Hide error, N/A, and zero values

Formatting Data in the Spreadsheet

You can format the data in specific cells or in all of the cells in the spreadsheet.

To format specific cells in a spreadsheet:

1. Select a cell or multiple cells and open the Spreadsheet Options window.
2. In the **Display** field, select **Cell**.

To format all of the cells in a spreadsheet:

1. Click on the **Select All** button.
2. Open the Spreadsheet Options window.
3. In the **Display** field, select **Cell**.

Click on the toggle button to open the panel that contains the formatting options you want to change.

When formatting overlapping elements in a spreadsheet, such as a column and then a cell within the column, the last element formatted overrides any previous option settings.

You can also use Control key combinations to format data in the spreadsheet. See Appendix B, “Keyboard Alternatives” on page 129 for specific key combinations.

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Displaying Formula Rules Versus Results

By default, a cell that contains a formula displays the results of the calculation rather than the formula itself.

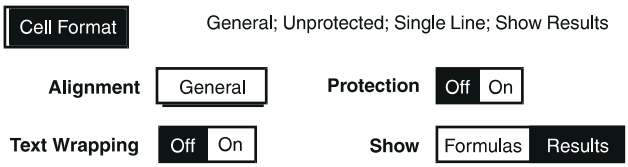
To change the display:

1. Select the cell, then press and release Ctrl+A.

This key combination enables you to toggle back and forth between displaying the formula rules an the formula results. When you display the formula rules, you can edit the formula directly in the cell.

Alternatively, you can change the display as follows:

1. Select the cell and open the Spreadsheet Options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Cell Format options panel is not already open, click on **Cell Format**.



4. In the **Show** field, select **Formulas** to display the formula or **Results** to display the results.
5. Click on Spreadsheet Options window.

Aligning Information in a Cell

By default, information in a cell has a general alignment: text and dates are left-aligned, and numbers are decimally aligned. You can set the cell format so that any data type appears left-justified, centered, or right-justified in the cell. When you click in an empty cell in the spreadsheet, the position of the insertion point indicates the alignment setting.

To change the alignment of information in a cell:

1. Select the cells you want to format or the entire spreadsheet, and open the options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Cell Format options panel is not already open, click on **Cell Format**.
4. In the **Alignment** field, select an alignment.
5. Click on Spreadsheet Options window.

   Alternatively, select the cell and use this key combination:

Ctrl+L to left-justify text and date information

Ctrl+C to center text and date information

Ctrl+R to right-justify text and date information

Ctrl+G to left-justify text and date information, right-justify formulas, and decimally align numbers

Formatting Text

The Spreadsheet tool provides the following options for formatting text:

Setting the font

Wrapping text

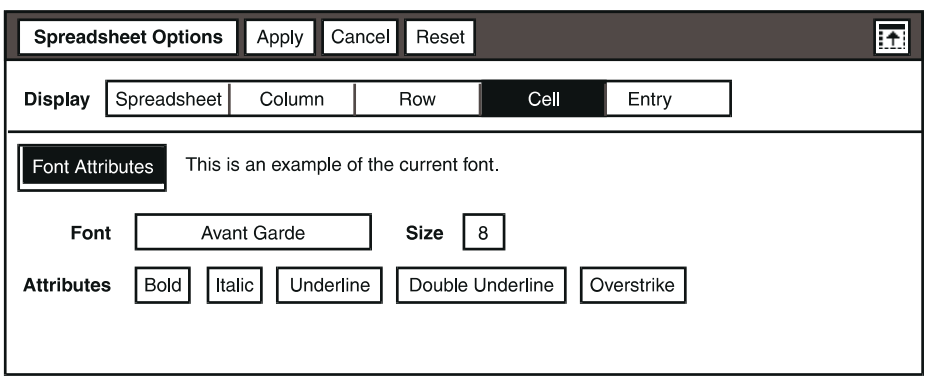
Setting the Font

When you copy a blank Spreadsheet icon from the New Icons file drawer, it is set to use the default font currently selected in your Set Preferences window. You can change the font for selected cells or for the entire spreadsheet.

Changing the typeface in the desktop's Set Preferences window does not change the typeface in existing spreadsheets.

To change the font:

1. Select the cells you want to format or the entire spreadsheet, and open the options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Font Attributes options panel is not already open, click on **Font Attributes**.



4. Select the font and size you want to use from the **Font** and **Size** fields.
5. If you want to make the text bold, italic, underlined, double underlined, or over-stricken, select the appropriate choices from the **Attributes** field. You can select any combination of attributes.

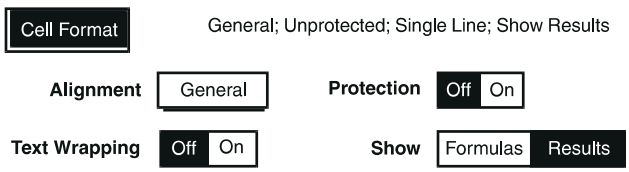
6. Click on Spreadsheet Options window.

Wrapping Text

Instead of having long strings of text extend into adjacent cells, you can format a cell to wrap the text so that it is displayed on multiple lines within a cell. When you wrap text, you may also want to change the row height as described in “Changing Row Height” on page 49.

To format a cell for text wrapping:

1. Select the appropriate cells and open the options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Cell Format options panel is not already open, click on **Cell Format**.



4. In the **Text Wrapping** field, select **On**.
5. Click on Spreadsheet Options window.

Formatting Numbers

Number formatting does not affect the way the Spreadsheet tool stores values, only the way it displays them. For example, you can specify how many decimal places are displayed. This does not affect the precision of calculations.

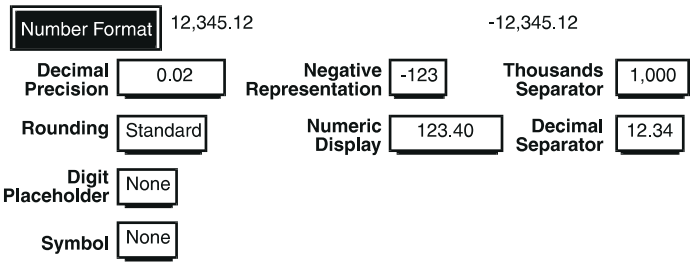
When you format numbers in a spreadsheet, you can change:

- Decimal precision
- Rounding
- The length of a number
- The symbol displayed with the number
- Negative representation
- How the number is displayed
- The separator used for thousands and decimals

To change the number format:

1. Select the appropriate cells and open the options window.
2. If the **Cell** options are not already displayed, click on **Cell** in the **Display** field.
3. Click on the **Number Format** toggle button to open the appropriate options panel.

The field at the top of the panel shows an example of the currently selected formats for positive and negative numbers.



4. In the various fields, select the formats you want to use from the choice menus. Consult the table that follows this procedure for information about each field.
5. To put your changes into effect, close the Spreadsheet Options window or click on **Apply**.

Use this field	To do this
Decimal Precision	Specify how many digits appear to the right of a decimal point.
Rounding	Choose whether to round or truncate a number at the specified number of decimal places. The choices are **Standard** and **Truncate**.
Digit Placeholder	Specify the number or symbol used to lengthen the integer part of a number. The choices are no placeholder, zero (0), space, or asterisk (*).
Symbol	Display a symbol with a number. The choices are no symbol, dollar sign ($), percent (%), or another symbol that you specify.
Negative Representation	Specify a negative sign before or after the number (-123 or 123-), parentheses (123), square brackets [123], or angle brackets <123> to indicate negative values.
Numeric Display	Choose the format for displaying numbers. The choices are standard (0.754), general (.041), and scientific (1.2340E2).
Thousands Separator	Specify the format used for a number in the thousands. The choices are no separator (1000), space (1 000), comma (1,000), period (1.000), or apostrophe (1'000).
Decimal Separator	Choose either a period (12.34) or a comma (12,34) as the character used as a decimal separator.

The following sections describe each field in detail.

Setting the Displayed Precision

You can use the **Decimal Precision** field to change the number of decimal places that you want to display in a spreadsheet. The default number of decimal places is determined by the setting in the desktop's Set Preferences window. Numbers with more than twelve decimal places are automatically rounded to the twelfth decimal place.

To change the number of decimal places displayed in the spreadsheet:

1. Select the appropriate cells and open the options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Number Format options panel is not already open, click on **Number Format**.
4. In the **Decimal Precision** field, select the choice you want to use.
5. Click on Spreadsheet Options window.

Regardless of the **Decimal Precision** setting, the value of the entered number is retained by the spreadsheet. You can set the spreadsheet to use either the displayed or the full precision for calculations. For more information about setting these options, see “Performing Calculations with Full or Displayed Precision” on page 31.

Rounding and Truncating

You can have a displayed number rounded or truncated to your displayed decimal precision. By default, the number is rounded.

To change the default:

1. Select the cell and open the options window. The Spreadsheet Options window opens with the **Cell** options displayed.
2. If the Number Format options panel is not already open, click on **Number Format**.
3. From the **Rounding** field, select the appropriate choice:

   Standard. The last digit remains the same if it is less than 5; otherwise it is rounded up. The opposite is true for negative numbers.

   Truncate. The number is cut off at the number of decimal places specified in the **Decimal Precision** field.
4. Click on Spreadsheet Options window.

The following table shows how the same number displays at the first five decimal precision levels when the **Rounding** field is set to **Standard** and when it is set to **Truncate**. The number used in the table is 7.792578.

Precision	Standard	Truncate
0	8	7
0.1	7.8	7.7
0.02	7.79	7.79
0.003	7.793	7.792
0.0004	7.7926	7.7925
0.00005	7.79258	7.79257

Specifying the Length of a Number

You can use the **Digit Placeholder** field to specify the length of the integer part of a number.

For example, if the Spreadsheet tool has a column of serial numbers that are three to six digits in length and you want all of the serial numbers to contain six digits, you would select 0 in the **Digit Placeholder** field and 6 in the **Length** field.

To specify the length of a number:

1. Select the cell and open the options window. The Spreadsheet Options window opens with the **Cell** options displayed.
2. If the Number Format options panel is not already open, click on **Number Format**.
3. In the **Digit Placeholder** field, select zero, space, or asterisk to be displayed in the number.
4. In the **Length** field that appears, specify how many digits you want to display before the decimal point.
5. Click on Spreadsheet Options window.

Displaying Symbols with Numbers

You cannot enter a symbol (such as $ or %) into a number cell. To display a symbol with a number, you must appropriately format the cell.

To display a symbol with a number in a cell:

1. Select the cell and open the options window. The Spreadsheet Options window opens with the **Cell** options displayed.
2. If the Number Format options panel is not already open, click on **Number Format**.
3. In the **Symbol** field, select a symbol to display with a number.

   Select **Other**.

   A blank field appears where you can enter up to five characters.
4. Click on Spreadsheet Options window.

When you add a percent sign to a number, the number is automatically multiplied by 100. For example, if you have the number 0.05 in a cell and you format it with a percent sign, the number is displayed as 5%.

Displaying Negative Numbers

You can choose to have a negative number displayed with a preceding or following negative sign, or enclosed in parentheses, square brackets, or angle brackets.

To specify how negative numbers are displayed:

1. Select the cell and open the options window. The Spreadsheet Options window opens with the **Cell** options displayed.
2. If the Number Format options panel is not already open, click on **Number Format**.
3. In the **Negative Representation** field, select the appropriate choice.
4. Click on Spreadsheet Options window.

Displaying Numbers in Scientific Notation

By default, numbers are displayed in standard decimal format (for example, 123.40).

However, you can format cells to display numbers in scientific notation (for example, 1.2340E2). Or you can have numbers displayed in scientific notation only if the number otherwise exceeds the column width.

The following table contains information about each format.

Format	Description	Examples
Standard	Displays numbers in standard format.	46 0.754 376.9982
Scientific	Uses scientific notation. Allows only one digit in the integer portion of the number	5E+01 7.540E-01 3.7700E+02
General	Displays numbers in standard format. If the number is too long to fit in the current column, it is translated into scientific notation.	456.9452 0.41 1.955E+01

To change the notation used for numbers:

1. Select the appropriate cells and open the options window.
2. In the **Display** field, select **Cell** if it is not already selected.
3. If the Number Format options panel is not already open, click on **Number Format**.
4. In the **Numeric Display** field, select the choice you want to use.
5. Click on Spreadsheet Options window.

Specifying Thousands and Decimal Separators

You can choose a comma or period as a decimal separator. You can also specify the format used for a number in the thousands.

You cannot use the same separator for both decimals and thousands. For example, if you select a comma as the thousands separator, you cannot use a comma as the decimal separator.

To specify separators:

1. Select the cell and open the options window. The Spreadsheet Options window opens with the **Cell** options displayed.

2. If the Number Format options panel is not already open, click on **Number Format**.
3. In the **Thousands Separator** field, select a separator.
4. In the **Decimal Separator** field, select a separator.
5. Click on Spreadsheet Options window.

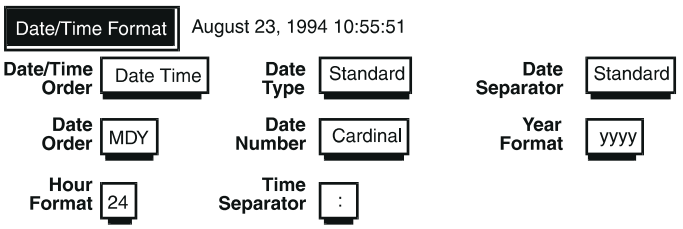
Formatting Dates and Times

You can change the way dates and times are displayed in your spreadsheet using the **Date/Time Format** panel options. These options allow you to set the style of the date and time, such as using the written name of the month or the month number, or changing the order of the month, day, and year. You can also specify the character used to separate the parts of a date.

To change the date and time format:

1. Select the appropriate cells and open the options window.
2. If the **Cell** options are not already displayed, click on **Cell** in the **Display** field.
3. Click on the **Date/Time Format** toggle button to open the appropriate options panel.

   The field at the top of the panel shows an example of the currently selected date and time formats.



4. In the various fields, select the formats you want to use from the choice menus. Consult the table that follows this procedure for information about each field.

   Date and time fields are interdependent. For example, if you specify a date type of **Numeric**, the date can be expressed a variety of ways (such as 02/18/94, 02-18-1994, 18.92.94), depending on the settings in other fields (such as **Year Format**, **Date Order**, and **Date Separator**).
5. To put your changes into effect, close the Spreadsheet Options window or click on **Apply**.

Use this field	To do this
Date/ Time Order	Specify the arrangement of the date and time, and whether both the date and time are shown. The choices are Date Time, Time Date, Date Only, and Time Only.

Use this field	To do this
Date Type	Specify how the date is displayed. Abbreviated displays the month as an abbreviated word and the year as two or four digits (depending on the choice in the **Year Format** field), as in Feb. 18, 1994. Long displays the day of the week and month fully spelled out and the year as two or four digits (depending on the choice in the **Year Format** field), as in Friday, February 18, 1994. Numeric displays dates as numbers, as in 02/l8/94. Standard displays dates with the month fully spelled out and the year represented by two or four digits (depending on the choice in the **Year Format** field), as in February 18, 1994.
Date Separator	Specify the character to separate the month, day, and year. The choices are Standard, slash (/), hyphen (-), period (.), or None. Standard means that if your Date Order is MDY, the month and day are separated by a space and the date and year are separated by a comma and space (as in October 19, 1994 or 10 19, 94). Otherwise, spaces are used to separate the month, day, and year (as in 19 October 1994).
Date Order	Specify the arrangement of the month (M), day (D), and year (Y). The choices are MDY, DMY, YMD, MY, DM, MD, and DY.
Date Number	Specify whether the day is to be expressed as a cardinal or ordinal number (for example, Feb 18 or Feb 18th).
Year Format	Specify the format of a year in a date entry. The choices are yy (two digits, as in 94) or yyyy (four digits, as in 1994).
Hour Format	Specify whether a 12-hour or 24-hour clock is to be used for time entries. If you specify the 12-hour clock, time entries are followed by a.m. or p.m.
Time Separator	Specify the character to separate the hours, minutes and seconds in time entries. The choices are colon (:), period (.), comma (,), hms (h for hours, m for minutes, and s for seconds), and None.

Changing Column Width

You can change the width and units of a single column or group of columns. For example, you can make a column wider when it is too narrow to display the numbers it contains. You can make a column narrower when it contains single-digit numbers, short text strings, or abbreviated data. The minimum column width is 0.20 inches or 0.508 cm; the maximum width is 10 inches or 25.40 cm.

To change the width of one or more columns:

1. Select the columns you want to change and open the Spreadsheet Options window. The **Column** options are displayed.

2. Replace the value in the **Width** field with another value between 0.20 and 10 inches. You can change the unit of measurement by selecting a different choice in the **Units** field.
3. Click on Spreadsheet Options window.

Changing Row Height

You can change the height and units of a single row or group of rows. For example, you can make a row higher when it crops large text or numbers. The minimum row height is 0.10 inches or 0.254 cm; the maximum height is 5 inches or 12.70 cm.

To adjust row height for best fit:

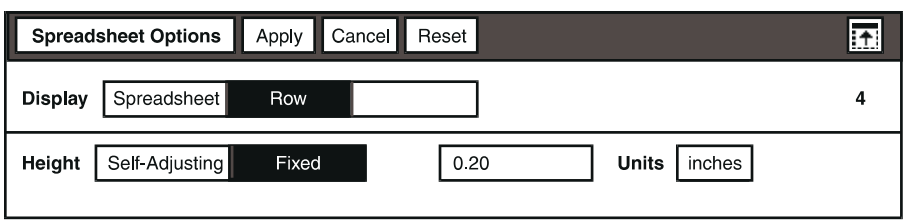
1. Select the row or rows you want to change.
2. From the Spreadsheet window's **Special menu**, select **Adjust Row Height**. The row height is increased or decreased for best fit.

   or

   Open the options window and select **Self-Adjusting** in the **Height** field, then click on **Apply** or close the window. The row height is increased to accommodate large entries. This choice does not decrease row height.

To manually adjust row height:

1. Select the row or rows you want to change and open the Spreadsheet Options window. The **Row** options are displayed.



2. In the **Height** field, select **Fixed**, then type a different value into the field. You can change the unit of measurement by selecting a different choice in the **Units** field.
3. Click on Spreadsheet Options window to put the change into effect.

Hiding Error, N/A, and Zero Values

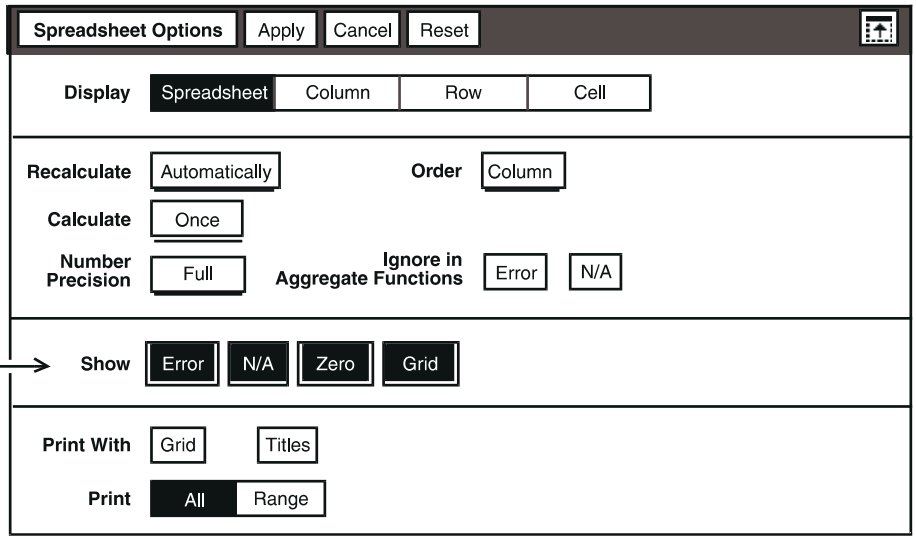
You can choose to hide error, N/A, or zero values, or any combination of the three in the Spreadsheet window. The values are still contained in the spreadsheet even though they are hidden. When you print the spreadsheet, hidden values do not appear.

To hide error, N/A, or zero values in the Spreadsheet window:

1. Open the Spreadsheet Options window and display the options for the entire spreadsheet.

   The **Show** field contains toggle buttons that you can turn on or off. You can select all, some, or none of these buttons. Clicking on a button that is not selected turns it on. Clicking on a selected button turns it off.

2. In the **Show** field, specify the values that you want to hide by clicking on the appropriate button so that it is no longer highlighted.



Use this field to hide or show error, N/A, and zero values, and the grid in the spreadsheet.

3. Click on Spreadsheet Options window.

   The spreadsheet hides the specified values.

The **Show** field settings are not retained when you copy or move data to another Spreadsheet icon.

Hiding Grid Lines

The vertical and horizontal lines that form the columns, rows, and cells are referred to as the *grid lines*. You can hide the grid lines to check the appearance of data in the spreadsheet before you print it.

To prevent the grid lines from showing in the Spreadsheet window:

1. Click on the Select All button in the Spreadsheet window and open the options window. The options for the entire spreadsheet are displayed.
2. In the **Show** field, click on **Grid** so that it is no longer highlighted.
3. Click on Spreadsheet Options window. The grid disappears from the Spreadsheet window.

Grid lines do not appear when you print the spreadsheet unless you specify **Grid** in the **Print With** field of the Spreadsheet Options window. See “Printing the Spreadsheet Grid Lines” on page 58 for more information.

Chapter 9. Working with Regions

A region is a single cell or range of cells to which you have assigned a unique name. You can create a region using cells that already contain data. You can use regions to:

Simplify formula construction

For example, you can use a formula such as sum([Sales]) instead of sum(a3:d9) when you designate cells A3 through D9 as a region named Sales.

Identify source or destination areas for data transferred within a Capsule application

Identify input and output areas within the spreadsheet

For example, a spreadsheet can use a region to specify the input data for a BASIC program, and another region to specify the location of the output.

This chapter describes how to:

Create a region

Select a region

Change the name of a region

Change the size of a region

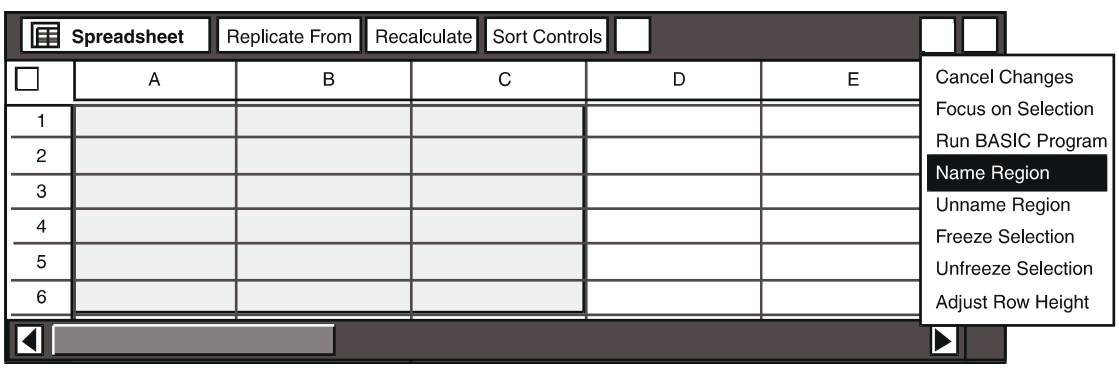
Unname, move, and delete regions

Creating a Region

You can create a region anywhere in the spreadsheet using the **Name Region** choice in the **Special** menu.

To create a region:

1. Select the cell or range of cells that you want to identify as a region.
2. From the Special menu, select **Name Region**.



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The Spreadsheet Options window opens with the **Region** options displayed, as shown in Figure 3 on page 53. Notice that the **Coordinates** field displays the coordinates of the selected cells.

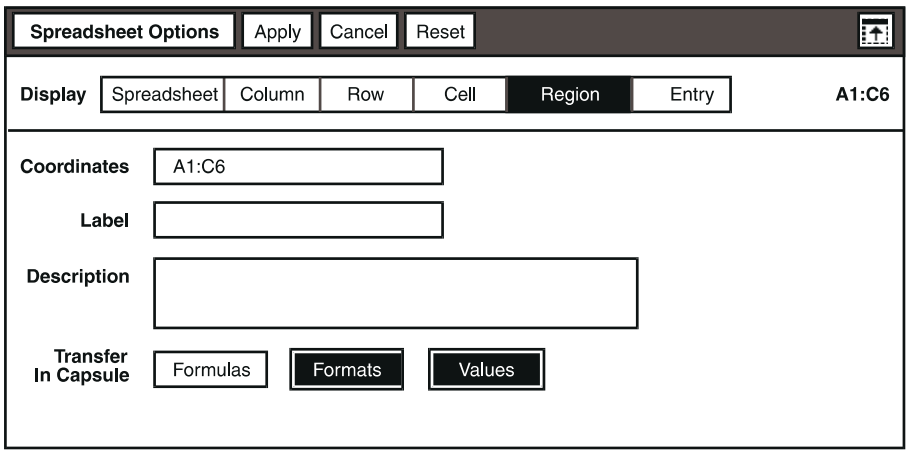

Figure 3. Region page of the Spreadsheet Options window

3. In the **Label** field, enter a name for the region, using up to 90 characters.
4. In the **Description** field, type a brief description if you wish. This information is for reference only. The description can be up to 300 characters long.
5. If you plan to use the spreadsheet in a Capsule application, specify in the **Transfer In Capsule** field the type of information you want transferred. By default, formats and values are transferred.

   You can only transfer formulas if the destination icon is a spreadsheet.
6. Click on Spreadsheet Options window.

   A border appears around the region and the name of the region, preceded by the word Select, appears in the **Special** menu.

For example, if you enter Months in the **Label** field, the **Special** menu would contain a choice with the name Select [Months]. As you add and delete regions, the **Special** menu reflects the changes.

For more information about transferring data, see “Setting the Copy/Move Controls” on page 14 and “Transferring Formats to Other Tools” on page 61.

Selecting a Region

You can check to make sure your selection is correct by opening the Spreadsheet Options window to see if the Region page appears.

To select a region:

1. Click anywhere on the region border. The name of the region appears in your desktop message bar.

From the **Special** menu, select the appropriate region name (which is preceded by the word Select).

Changing the Name of a Region

When you change the name of a region, all references to that region within the spreadsheet are adjusted to reflect the name change.

To change the name of a region:

1. Select the region and open the Spreadsheet Options window. The **Region** options are displayed.
2. In the **Label** field, replace the existing name with the new name.
3. Click on Spreadsheet Options window.

Changing the Size of a Region

You can expand or reduce the size of a region by:

Changing its coordinates in the **Coordinates** field

Adding or removing columns or rows to or from the region

Changing the Coordinates of a Region

You can edit the cell coordinates in the **Coordinates** field to increase or decrease the size of the region.

To change the region coordinates:

1. Select the region and open the Spreadsheet Options window. The **Region** options are displayed.
2. In the **Coordinates** field, replace the existing coordinates with the new coordinates.
3. Click on Spreadsheet Options window.

Expanding or Reducing a Region by Adding Columns or Rows

You can expand the size of a region by copying or moving columns or rows into the region.

To add columns or rows to a region:

1. Select one or more columns or rows that you want to add to the region.
2. Activate the copy or move function.
3. Select as the destination the column or row inside the region after which you want to copy or move the selection.

If you copy or move columns and rows after the last column or row in a region, the new columns or rows are added outside the region boundary.

The region expands to accommodate the new columns or rows. The region coordinates are updated automatically.

You can shrink the size of a region by removing columns or rows from inside its boundaries. The region coordinates are updated automatically, and the border shrinks to accommodate fewer cells. If you delete every row or every column from a region, the region disappears and the region name is removed from the Special menu.

Unnaming, Moving, and Deleting Regions

To remove a region from a spreadsheet:

1. Select the region.
2. From the **Special** menu, select **Unname Region**.

When you unname a region, the following changes occur in the spreadsheet:

The region's border is removed, but the cells that were in the region are unaffected.

In the formulas within the spreadsheet, references to the removed region are replaced with the region's cell coordinates.

The region name is removed from the **Special** menu.

When you select a region and then move it to another location, the contents of the region are moved, but the region itself remains where it is.

When you select a region and then press Delete, the information in the region is deleted, but the region itself remains intact. However, when you delete everything in the spreadsheet, regions are deleted.

Chapter 10. Printing a Spreadsheet

The Spreadsheet tool uses the standard printing options available in the Icon Options window to set printing options such as orientation, margin width, the addition of headers and footers, and page numbers.

In addition, spreadsheets have other printing options that you set in the Spreadsheet Options window. These include:

- Printing part of a spreadsheet
- Printing with grid lines
- Printing row and column headings on each page

For more information about setting spreadsheet printing options, see *Working With the Intelligent Decision Server*.

Your printer may not support all the fonts available in IDS. If you select a font that is not supported by your printer, Courier is used as the substitution font.

This chapter describes panel pages and how to print:

- A wide spreadsheet
- A range of cells
- The spreadsheet grid
- Column and row headings on every page

Printing a Wide Spreadsheet

When the output from a Spreadsheet icon is too wide for the paper, the information that flows over the right edge is continued on a new page.

To aid in assembling the printed output, a panel page is printed to illustrate how the individual pages fit together to make a complete document.

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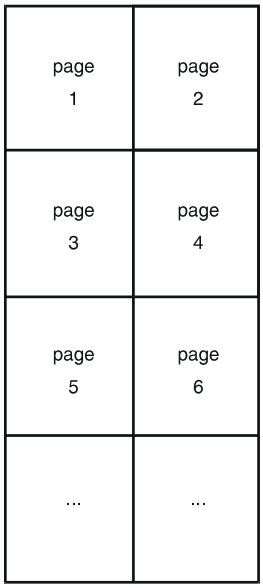

You can see how much information fits on each page of the spreadsheet by clicking on the **Show Page Break** button in the Spreadsheet window header. The page breaks are displayed as dark lines in the spreadsheet.

Printing a Range of Cells

You can print part of a spreadsheet simply by copying a range of cells directly to a Printer icon.

Alternatively, you can specify a range of cells in the Spreadsheet Options window and then copy the Spreadsheet icon to the Printer icon. This way, you can specify other printing options as well (such as the inclusion of grid lines or page numbers).

To specify a range of cells for printing:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Print** field, select **Range**.

   The **Coordinates** field appears.

3. In the **Coordinates** field, enter the range of cells you want to print.
4. Click on Spreadsheet Options window.

When you copy the Spreadsheet icon to a Printer icon, only the range you specified is printed.

Printing the Spreadsheet Grid Lines

You can print the spreadsheet either with or without grid lines. By default, spreadsheets are printed without grid lines.

To print the spreadsheet with grid lines:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Print With** field, select **Grid**.
3. Click on Spreadsheet Options window.

Printing Column and Row Headings

You can print one or more row or column heading as titles on each page. Rows and columns that are designated as titles become the top and left boundaries of the printed material. That is, only the cells below or to the right of the titles are printed.

To print row and column headings as titles:

1. Click on the **Select All** button and open the Spreadsheet Options window. The options for the entire spreadsheet are displayed.
2. In the **Print With** field, select **Titles**.

   The **Rows** and **Columns** fields appear.

3. In the **Rows** and **Columns** fields, enter the appropriate row number and column label. If you want to use more than one row or column, separate the first and last row number or column label with a colon. For example, specify rows 1 though 3 as 1:3.
4. Click on Spreadsheet Options window.

   When you specify titles, there must be data below and to the right of the titles for the spreadsheet to be printed. If you specify the entire data set as titles, the spreadsheet is not printed.

For example, suppose you have the following spreadsheet.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	Chicago	34,000	84,660
3	Los Angeles	37,400	100,606
4	New York	42,300	105,327
5	HIGHEST SALES		= 105,327

To print the titles, you would type 1 in the **Rows** field. If you type A:C in the **Columns** field, the spreadsheet is not printed, because you have specified the entire data set as titles.

Chapter 11. Using Expert Features

Once you have created a spreadsheet, you can transfer information to and from other spreadsheets and IDS tools.

This chapter describes how to:

Copy and move information from other tools

Use the Spreadsheet tool in a capsule application

Transfer formats to other tools

Read data from other Spreadsheet icons

Call a BASIC program from a spreadsheet

Copying and Moving Information from Other Tools

You can transfer information into a spreadsheet by copying or moving the data manually from other tools, including Query, Transformer, Reporter, Text, and other Spreadsheets.

You can also transfer information from a Spreadsheet to other tools such as Query, Transformer, Reporter, Text, and other Spreadsheets. However, when the Spreadsheet is the source icon, the characteristics that transfer with the information (formulas, formats, and values) are dependent on the settings in the Copy/Move Controls window, as described in “Setting the Copy/Move Controls” on page 14.

The spreadsheet automatically sets the cell Spreadsheet Options window when dates are transferred into cells from regions or from other tools.

To copy or move data manually from another tool to a spreadsheet:

1. Open the icon whose data you want to transfer to the spreadsheet (the source icon).
2. Click on the **Select All** button in the source icon.

   Select specific portions of the source icon.
3. Copy or move the data to the first cell in the destination spreadsheet in which you want the transferred data to be placed.

Using Spreadsheet in a Capsule Application

Within a capsule application, data is automatically transferred from tool to tool. The Spreadsheet tool can be used in a capsule application with other tools.

To use the Spreadsheet tool in a capsule application:

1. Copy a Spreadsheet icon into the Capsule window.

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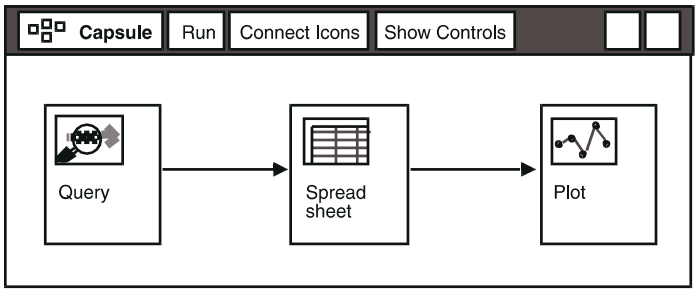
2. Connect the Spreadsheet icon to the appropriate icons.
3. Select the Capsule window header.

The following capsule application contains a Query icon as the source for the Spreadsheet icon, and a Plot icon as the destination.



When you use the Spreadsheet tool in a capsule application, you can use @-variables with assigned values in the Capsule's User Input Control window to generate values in the spreadsheet. The Spreadsheet tool automatically retrieves the @-values when it is calculating. See the *Capsule User's Guide* for information about defining @-variables.

Transferring Formats to Other Tools

When transferring data to other tools, the format characteristics will transfer as the default. When running a Capsule and the source region is in the Spreadsheet, you can control the characteristics of the transfer, including formats, through the Spreadsheet Options window. You can also control the transfer of formats in the Capsule's Arrow Options window by making the appropriate selection in the **Transfer Data Attributes** field. For more information on arrow options, see the *Capsule User's Guide*.

When you transfer formats in a region in a Capsule application, the settings in the Capsule's Arrow Options window can override the spreadsheet's settings.

For controlling transfer of formats in interactive move/copy, see “Setting the Copy/Move Controls” on page 14 and the *Capsule User's Guide* for more information.

Reading Data from Other Spreadsheets

You can enter data into a spreadsheet cell by reading it in from a cell or region in another spreadsheet. The location of the data referenced in the source spreadsheet is known as an *external reference*. Instead of creating a large, unmanageable spreadsheet, you can use external references to break your work into smaller, logically related parts to exchange data between spreadsheets.

For example, suppose you have a single spreadsheet that contains both a balance sheet and an income statement because some values are related. You would create one spreadsheet containing the balance sheet and another containing the income state-

ment to make the data more manageable. You would then use external references to perform calculations on the related values.

To enter data by reading an external reference from another Spreadsheet icon:

1. Select the cell in which you want to use the external reference and open the Spreadsheet Options window.
2. In the **Entry** field, enter the reference to the other spreadsheet.

   From the source spreadsheet, copy the cell or region that you want to reference into the **Entry** field. The name of the referenced Spreadsheet icon and of the cell coordinate or region are automatically entered into the field for you.

An external reference must include the name of the source spreadsheet enclosed in braces, followed by the cell coordinate or region name. For example, to use the value from cell E8 in a spreadsheet named Western Territory, you would enter:

```
{Western Territory}E8
```

You can use an external reference to a region only as an argument of a function. For example:

```
sum({Western Territyory}[Unit Sales])
```

After entering the external reference, a new choice, **Reread External Values,** appears in the spreadsheet's **Special** menu. You must select this choice to read the values from the external reference into the cell.

Important facts to remember when using external references:

The source spreadsheet must be on the same level as the destination spreadsheet (on your desktop or in the same container, such as in a Capsule application). The source spreadsheet icon can be open or closed.

The values of external references are reread each time the spreadsheet is opened.

If the spreadsheet is in a capsule application, the values of external references are reread each time you run the capsule application.

If the spreadsheet is not in a capsule application, values are not reread each time the spreadsheet is recalculated. You must select the **Reread External Values** from the **Special** menu to update the values from external references.

External references are not adjusted when copied or moved to other locations.

Running a BASIC Program from a Spreadsheet

You can use the IDS BASIC tool to develop a BASIC program that reads cell values from one or more input regions in a spreadsheet, processes the data, and then writes the results to one or more output regions in the spreadsheet. You can also use an existing program to perform a trend analysis on data in the spreadsheet and put the results into another location in that same spreadsheet.

To run the BASIC program:

1. In the cell from which you want to invoke the program, enter the call statement of the BASIC program, as shown in the following syntax illustration.
2. Select the cell containing the call.
3. From the Spreadsheet's **Special** menu, select **Run BASIC Program**.

Syntax

BASIC source_icon {.program_name}([input];[output])

where:

source_icon	Is the name of the icon that contains the BASIC program. If it is located in a system file drawer, precede the name with the file-drawer name followed by a vertical bar (filedrawer|source_icon).
program_name	is the optional name of the BASIC program.
[input]	Is the name or list of names of the regions containing the source data for the BASIC program.
[output]	Is the name or list of names of the regions that will receive the results.

Remarks

For programs that use multiple regions (either for input, output, or both), place each region name in brackets and separate them with a comma. Use a semicolon (;) to separate input regions from output regions.

The BASIC icon must be located in a system file drawer or at the same level as the Spreadsheet icon —directly on the desktop or in the same container.

The names of the source icon and program cannot contain spaces.

Examples

BASIC Matrix ([Input 1], [Input 2]; [Output])

BASIC Matrix ([Input 1], [Input 2]; [Output 1], [Output 2])

BASIC Matrix ([Input]; [Output 1], [Output 2])

To stop the program at any time:

1. Press the stop key.

Spreadsheet values must be recalculated after all programs have been run. To recalculate spreadsheet values after running a BASIC program:

1. Type/r at the end of the BASIC statement, as follows:

BASIC Matrix ([Input1], [Input2]; [Output1], [Output2])/r

Click on the Spreadsheet window header.

For more information about using BASIC programs in a spreadsheet, see the *BASIC Tool User's Guide*.

If you have a text cell not intended as a reference to a BASIC program but contains a part that is similar in name in a syntax for calling a BASIC program, a capsule application will stop running and a message will appear informing you of the problem.

Appendix A. Functions

A function is a special command that performs calculations on specified values (known as arguments) and returns a result. The Spreadsheet tool includes predefined functions to help you create formulas that perform statistical, mathematical, date and time, financial, string, and table calculations on the data you specify.

This appendix describes each of the operators and functions provided by the Spreadsheet tool, including syntax and examples.

In syntax examples, the following conventions are used:

Braces can denote optional text or an external reference to a spreadsheet. If the braces denote optional text, do not type them.

Region names must be enclosed by brackets.

Slanted type denotes variables. Substitute your own values for variables.

The variable period refers to a time span. Substitute the appropriate period: second, minute, hour, day, week, qweek (quadweek), month, bimonth, ebimonth (evenbimonth), quarter, or year.

Types of Functions

The Spreadsheet tool provides six categories of functions:

Statistical

Mathematical

Date and time

Financial

String

Table

Miscellaneous and Logical

You can get help in using functions in the Spreadsheet Options window. See “Getting Help Using Functions” on page 25 for more information.

Statistical Functions

The Spreadsheet tool provides eight statistical functions located in the **Statistics** menu. Table 3 on page 66 lists each function and provides an example of its usage and a brief description. Detailed information about each statistical function follows.

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Table 3. Statistical functions

Function	Syntax	Example	Description
average	average (list of items)	average([Region A]) average(a2:b7) average(a3,b4,c5)	Adds a list of values together, divides the result by the number of items in the list, and returns that value.
count	count (list of items)	count([Region A]) count(a2:b7) count(a3,b4,c5)	Determines the number of cells that contain numeric values in a group of cells. Ignores any cells that contain N/A or error values.
median	median (list of items)	median([Region A]) median(a2:b7) median(a3,b4,c5)	Sorts the values in a list of items from lowest to highest and returns the value in the middle of the list.
mode	mode (list of items)	mode([Region A]) mode(a2:b7) mode(a3,b4,c5)	Returns the most frequent value in a list of items.
random	random	random	Returns a random number between 0 and 1.
std dev	std dev (list of items)	std dev([Region A]) std dev(a2:b7) std dev(a3,b4,c5)	Returns the square root of the variance of a set of values.
sum	sum (list of items)	sum([Region A]) sum(a3,b4,c5) sum(b2:b7)	Adds the values of a list of items.
variance	variance (list of items)	variance([Region A]) variance(a2:b7) average(a3,b4,c5)	Determines how much values of individual cells vary from the average of the entire group of cells.

All of the statistical functions are aggregate functions. You can set a spreadsheet to ignore error values, N/A values, or both when it performs calculations with aggregate functions. For more information, see “Ignoring Error and N/A Values in Aggregate Functions” on page 31.

Average — Calculating the Average

Use the **average** function to find the average value of the contents of a group of cells or series of numbers.

Syntax

average(list of items)

where:

list of items — Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Examples

average(a2,b3,c4,d5)

average(a2:b77)

average([Region A])

average(a1,c3,a2:b8,[Region A])

average({Spreadsheet A}[Region A])

average(5,7,a6:d7,z91)

Suppose you have the following spreadsheet showing unit and dollar sales for two territories. To find the average number of units sold and dollar sales for the combined territories, you would use the **average** function.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	New York	120,000	1,074,400
3	Los Angeles	117,000	1,035,000
4	AVERAGES	= average(b2:b3)	= average(c2:c3)

The following spreadsheet shows the results of the formulas.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	New York	120,000	1,074,400
3	Los Angeles	117,000	1,035,000
4	AVERAGES	= 118,500	= 1,054,700

Count — Counting Numeric Values

Use the **count** function to count the number of cells that contain numeric values in a group of cells. Empty cells and cells that contain non-numeric entries, such as error or N/A values, are ignored.

Syntax

count(list of items)

where:

list of items — Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Examples

count(a1,b2,c3,d4)

count(a2:b77)

count([Region A])

count(a1,c3,a2:b8,[Region A])

count({Spreadsheet A}[Region A])

count(1,a5:b21,c9)

Suppose you have the following spreadsheet that reports the number of units sold for three territories during the first three months of the year. To show the number of territories that reported each month you would use the **count** function.

	A	B	C	D
1		JANUARY	FEBRUARY	MARCH
2	Chicago	12000	17400	15300
3	New York	= N/A	8400	9030
4	St. Louis	11700	13400	12700
5				
6	TERRITORIES REPORTING	= count(b2:b4)	= count(c2:c4)	= count(d2:d4)

For the month of January, only two territories reported sales. The **count** function ignores cell b3 because it contains an N/A value.

	A	B	C	D
1		JANUARY	FEBRUARY	MARCH
2	Chicago	12000	17400	15300
3	New York	= N/A	8400	9030
4	St. Louis	11700	13400	12700
5				
6	TERRITORIES REPORTING	= 2	= 3	= 3

Median — Finding the Middle Value

Use the **median** function to find the middle value in a group of cells or series of numbers. The **median** function sorts the values from lowest to highest and returns the value in the middle of the range.

Syntax

median(list of items)

where:

list of items — Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Remarks

If there are an even number of arguments, **median** returns the average of the two middle values.

Examples

median(a1,b2,c3,d4)

median(a2:b77)

median([Region A])

median(a1,c3,a2:b8,[Region A])

median({Spreadsheet A}[Region A])

median(1,3,5,7,21,23,9)

The following spreadsheet lists the average price of a product for four quarters in three sales territories. You would use the **median** function to calculate the median price for each territory and for all three territories.

	A	B	C	D
1	Eastern	Central	Western	
2	11.57	8.77	12.77	
3	13.29	10.19	11.16	
4	12.61	11.69	12.08	
5	12.19	10.91	11.01	
6	= median(a2:a5)	= median(b2:b5)	= median(c2:c5)	= median(a2:c5)

The following spreadsheet shows the results of the formulas.

	A	B	C	D
1	Eastern	Central	Western	
2	11.57	8.77	12.77	
3	13.29	10.19	11.16	
4	12.61	11.69	12.08	
5	12.19	10.91	11.01	
6	= 12.40	= 10.55	= 11.62	= 11.63

Mode — Finding the Most Frequent Value

Use the **mode** function to calculate the most frequent value in a group of cells or series of numbers.

Syntax

mode(list of items)

where:

list of items	Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Remarks

If each value in the list of items is unique, the average is returned. If several values have the same highest frequency, the average of the highest frequency values is returned.

Examples

mode(a1,b2,c3,d4)

mode(a2:b77)

mode(a1,c3,a2:b8,[Region A])

mode({Spreadsheet A}[Region A])

mode(1,3,5,7,21,23,9,3)

Suppose you have the following spreadsheet that lists the average price of a product for four quarters in three sales territories. You would use the **mode** function to calculate the most frequent price in each territory and the most frequent price for all three territories.

	A	B	C	D
1	Eastern	Central	Western	
2	13.29	8.79	12.79	
3	13.29	10.39	11.09	
4	12.39	11.69	12.79	
5	12.69	10.99	11.09	
6	= mode(a2:a5)	= mode(b2:b5)	= mode(c2:c5)	= mode(a2:c5)

In column B, each value is unique, so the **mode** function returns the average of the four values. In column C, two different values each appear twice, and the average is returned.

	A	B	C	D
1	Eastern	Central	Western	
2	13.29	8.79	12.79	
3	13.29	10.39	11.09	
4	12.39	11.69	12.79	
5	12.69	10.99	11.09	
6	= 13.29	= 10.47	= 11.94	= 12.39

Random — Generating a Random Number

Use the **random** function to generate a positive random number between zero and one. A new number is generated each time the spreadsheet is recalculated.

Syntax

random

Std Dev — Calculating the Standard Deviation

Use the **std dev** function to find the standard deviation of a series of numbers. You can use the **std dev** function when a set of values varies widely and you want to examine the amount of variance as compared to the average of those numbers. The standard deviation is the square root of the variance of a set of values. The **variance** function is described on "Variance — Calculating the Variance" on page 73.

Syntax

std dev(list of items)

where:

list of items — Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Examples

std dev(a1,b2,c3)

std dev(a2:b77)

std dev(a1,c3,a2:b8,[Region A])

std dev({Spreadsheet A}[Region A])

Suppose you have the following spreadsheet on the left that lists the quarterly dollar sales figures for 1994. If you average the sales figures, as shown by the formula in cell b6, the resulting number is either much lower or much higher than any of the actual quarterly figures, as shown in the spreadsheet on the right. To put the average in perspective, you would find the standard deviation for the sales figures, as shown by the formula in cell b7. The result is shown in the spreadsheet on the right.

	A	B
1	QUARTER	DOLLAR SALES
2	1Q94	2,400,000
3	2Q94	2,700,000
4	3Q94	6,200,000
5	4Q94	6,700,000
6	AVERAGE	= average(b2:b5)
7	STD DEV	= std dev(b2:b5)

	A	B
1	QUARTER	DOLLAR SALES
2	1Q94	2,400,000
3	2Q94	2,700,000
4	3Q94	6,200,000
5	4Q94	6,700,000
6	AVERAGE	= 4,500,000
7	STD DEV	= 2,264,214

Sum — Adding Values

Use the **sum** function to add the contents of a series of numbers.

Syntax

sum(list of items)

where:

list of items — Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Examples

sum(a1,b2,c3)

sum(a2:b77)

sum([Region A])

sum(a1,17,a2:b8,[Region A])

sum({Spreadsheet A}[Region A])

sum(1,3,5,7.33,21,23.2,9)

Suppose you have the following spreadsheet that contains the unit and dollar sales for three sizes of a cola product. To calculate the combined unit and dollar sales for the three sizes, you would use the **sum** function.

	A	B	C
1	PRODUCT	UNITS	DOLLARS
2	Cola 16 oz	9,700	120,300
3	Cola 12 oz	12,000	174,400
4	Cola 6 oz	11,700	138,000
5	TOTALS	= sum(b2:b4)	= sum(c2:c4)

The following spreadsheet shows the results of the formulas.

	A	B	C
1	PRODUCT	UNITS	DOLLARS
2	Cola 16 oz	9,700	120,300
3	Cola 12 oz	12,000	174,400
4	Cola 6 oz	11,700	138,000
5	TOTALS	= 33,400	= 432,700

Variance — Calculating the Variance

Use the **variance** function to calculate how much individual values vary from the average of the entire group of values. You can use the **variance** function when you have a set of values that varies widely and you want to examine the amount of variance compared to the average of those numbers. The **variance** function calculates the sample variance, which is different from the population variance. The variance is the square of the standard deviation, as described on “Std Dev — Calculating the Standard Deviation” on page 71.

Syntax

variance(list of items)

where:

list of items	Is an arbitrary listing of literal numbers, cells, ranges, regions, or external references.

Examples

variance(a1,b2,c3,d4)

variance(a2:b77)

variance([Region A])

variance(a1,c3,a2:b8,[Region A])

variance({Spreadsheet A}[Region A])

variance(1,3,5,7.33,21,23. 2,9)

Suppose you have the spreadsheet on the left that lists the number of new accounts that were acquired during each quarter in 1994. If you average the figures, as shown in cell b6, the result of the formula is either much lower or much higher than any of the actual quarterly figures. To look at the amount of dispersion around that average, you would calculating the variance between the values and the mean of those values by using the formula variance(b2:b5). The spreadsheet on the right provides the results of the formulas.

	A	B
1	QUARTER	NEW ACCOUNTS
2	1Q94	12
3	2Q94	13
4	3Q94	32
5	4Q94	37
6	AVERAGE	= average(b2:b5)
7	VARIANCE	= variance(b2:b5)

	A	B	
1	QUARTER	NEW ACCOUNTS	
2	1Q94	12	
3	2Q94	13	
4	3Q94	32	
5	4Q94	37	
6	AVERAGE	=	24
7	VARIANCE	=	166

Mathematical Functions

The Spreadsheet tool provides 10 mathematical functions located in the **Math** menu. Table 4 lists each function and provides an example of its usage and a brief description. Detailed information about each mathematical function follows.

Table 4. Mathematical functions

Function	Syntax	Examples	Description
abs	abs(item)	abs(a3) abs(-7)	Returns the value of a positive or negative number as a positive number.
exp	exp(item)	exp(1) exp(a2)	Computes the value of the constant **e** raised to a specific power. The inverse of the **ln** function.
fract	fract(item)	fract(79.832) fract(a2)	Returns the decimal part of a number.
int	int(item)	int(d7) int(-2.5)	Returns the value of the specified number as an integer.
ln	ln(item)	ln(43) ln(a3)	Calculates the natural logarithm, base **e**, of a number. The inverse of the **exp** function.
log	log(item)	log(a7) log(99)	Returns the base 10 logarithm of a number.
max	max(list of items)	**max(a2:b7)** **max(4,g7,h8:h13)**	Returns the maximum value found in a specified list.
min	min(list of items)	min(a3,b4,c5) min([Region A])	Returns the minimum value found in a specified list.
mod	mod(dividend , divisor)	mod(a1,c2) mod(17,3)	Returns the remainder after dividing one value by another.
round	round(item , precision)	round(a7,3) round(4.98765,2)	Rounds a number to the specified number of decimal places.

The **max**, **min**, and **mod** functions are aggregate functions. You can set a spreadsheet to ignore error values, N/A values, or both when it performs calculations with aggregate functions. For more information, see “Ignoring Error and N/A Values in Aggregate Functions” on page 31.

Abs — Calculating Absolute Value

Use the **abs** function to return the absolute value of a number. The value of a positive or negative number is returned as a positive number.

Syntax

abs(item)

where:

item is a single-cell reference or any literal number.

Examples

abs(a2)

abs(-7)

abs(.179)

The following spreadsheet lists the unit sales for three territories and the amount that each territory was over or under its sales quota. To calculate the total number of units that the territories are over or under quota, you would first calculate the absolute value of each quota figure, and then add the absolute values.

	A	B	C	D
1	TERRITORY	UNITS	QUOTA	ABSOLUTE VALUE
2	Chicago	34,000	(3,500)	= abs(c2)
3	Los Angeles	37,400	(2,400)	= abs(c3)
4	New York	42,300	5,300	= abs(c4)
5	TOTALS			= sum(d2:d4)

The following spreadsheet shows the results of the formulas.

	A	B	C	D
1	TERRITORY	UNITS	QUOTA	ABSOLUTE VALUE
2	Chicago	34,000	(3,500)	= 3,500
3	Los Angeles	37,400	(2,400)	= 2,400
4	New York	42,300	5,300	= 5,300
5	TOTALS			= 11,200

Exp — Calculating the Power of e

Use the **exp** function to compute the value of the constant **e** (2.7182818) raised to the power you specify in the argument. You can use the **exp** function to create statistical models. The **exp** function is the inverse of the **ln** (natural log) function, described on "Ln — Calculating Natural Logarithms" on page 78.

Syntax

exp(item)

where:

item is a single-cell reference or any literal number.

Examples

exp(a2)

exp(-7)

exp(.179)

Formulas using the **exp** and **ln** functions and the results are shown in the following spreadsheets.

	A	B	C	
1		Exp	Ln	
2	1.00	= exp(a2)	= ln(b2)	
3	2.00	= exp(a3)	= ln(b3)	
4	10.00	= exp(a4)	= ln(b4)	

	A	B	C	
1		Exp	Ln	
2	1.00	= 2.718	= 1.00	
3	2.00	= 7.389	= 2.00	
4	10.00	= 22,026.466	= 10.00	

Fract — Extracting the Fractional Part of a Number

Use the **fract** function to extract the fractional value of a number, which is usually the decimal part of a number.

Syntax

fract(item)

where:

item Is a single-cell reference or any literal number.

Examples

fract(a2)

fract(-7.5)

fract(.179)

fract(b2/7)

Suppose you have the following spreadsheet that lists the lengths of blocks of cheese after they are sliced by an automatic cheese-slicing machine. The machine is designed to slice the cheese in exact 12-inch lengths. You want to calculate the amount of cheese that is being lost due to inaccuracy of the cheese-slicing machine. You would use the fract function to extract the fractional part of the length of each block of cheese. You would then add the values to calculate the total cheese loss.

	A	B	C
1	Length (inches)		Loss (inches)
2	12.721	= fract(a2)	= sum(b2:b5)
3	12.186	= fract(a3)	
4	12.646	= fract(a4)	
5	12.372	= fract(a5)	

The following spreadsheet shows the results of the formulas. The total cheese loss is 1.925 inches.

	A	B	C
1	Length (inches)		Loss (inches)
2	12.721	= 0.721	= 1.925
3	12.186	= 0.186	
4	12.646	= 0.646	
5	12.372	= 0.372	

Int — Calculating the Integer of a Value

Use the **int** function to return the value of a number as an integer (whole number). The value can be either positive or negative. Use the **int** function when you are interested in results as whole numbers.

The **int** function truncates the number following the decimal point but still displays the appropriate number of decimal places based on the Spreadsheet Options window settings. For example, if decimal precision is set to two places, the number 8.79 would be returned as 8.00 after using the **int** function.

Syntax

int(item)

where:

item Is a single-cell reference or any literal number.

Examples

int(d7)

int(-2.79)

Suppose you have the following spreadsheet that lists the number of cases of raw material that were used in four production runs. To calculate the number of partial cases remaining after the production runs, you would use the **int** function. You would then add the resulting values to calculate the total cases remaining.

	A	B
1	CASES USED	PARTIAL CASES
2	22.75	= a2-int(a2)
3	14.50	= a3-int(a3)
4	13.25	= a4-int(a4)
5	11.75	= a5-int(a5)
6	TOTAL CASES REMAINING	= sum(b2:b5)

The following spreadsheet provides the results of the formulas. There are 2.25 cases remaining after the production runs.

	A	B
1	CASES USED	PARTIAL CASES
2	22.75	= 0.75
3	14.50	= 0.50
4	13.25	= 0.25
5	11.75	= 0.75
6	TOTAL CASES REMAINING	= 2.25

Ln — Calculating Natural Logarithms

Use the **ln** function to calculate the natural (base **e**) logarithm of a number where the value of **e** is 2.7182818. You can use the **ln** function to create statistical models. The **ln** function is the inverse of the **exp** function, described on “Exp — Calculating the Power of e” on page 76.

Syntax

ln(item)

where:

item Is any literal number or a single-cell that contains a number. The number must be positive.

Examples
ln(a2)

ln(7)

ln(.179)

Formulas using the **exp** and **ln** functions and the results are shown in the following spreadsheets.

	A	B	C	
1		Exp	Ln	
2	1.00	= exp(a2)	= ln(b2)	
3	2.00	= exp(a3)	= ln(b3)	
4	10.00	= exp(a4)	= ln(b4)	

	A	B	C	
1		Exp	Ln	
2	1.00	= 2.718	= 1.00	
3	2.00	= 7.389	= 2.00	
4	10.00	= 22,026.466	= 10.00	

Log — Calculating Logarithms
Use the **log** function to calculate the logarithm (base 10) of a positive number.

Syntax
log(item)

where:

item Is any literal number or a single-cell that contains a number. The number must be positive.

Remarks
The variable **item** must be positive.

Examples
log(e5)

log(5)

log(1.36)

Formulas using the **log** function and the results are shown in the following spreadsheets.

	A	B	
1		Log	
2	5.00	= log(a2)	
3	10.00	= log(a3)	
4	100.00	= log(a4)	

	A	B	
1		Log	
2	5.00	= 0.70	
3	10.00	= 1.00	
4	100.00	= 2.00	

Max — Finding the Maximum Value

Use the **max** function to calculate the largest value in a list of arguments. You can use the **max** function with dates.

Syntax

max(list of items)

where:

list of items — Is an arbitrary list of literal numbers, cells, ranges, regions, or external references.

Examples

max(A2, B3, C4, D5)

max(A2:B77)

max([Region A])

max(A1, C3, A2:B8, [Region A])

max(5, A7, {Spreadsheet A}[Region B])

max(A1, 18, B3:D1 , [Region A], {Spreadsheet A}C1)

The following spreadsheet lists the unit and dollar sales for three territories. To find the highest dollar sales you would use the **max** function.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	Chicago	34,000	84,660
3	Los Angeles	37,400	100,606
4	New York	42,300	105,327
5	HIGHEST SALES		= max(c2:c4)

The following spreadsheet shows the results of the formula. The highest sales value is 105,327 dollars for New York.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	Chicago	34,000	84,660
3	Los Angeles	37,400	100,606
4	New York	42,300	105,327
5	HIGHEST SALES		= 105,327

Min — Finding the Minimum Value

Use the **min** function when you want to calculate the smallest value in a list of arguments. You can use the **min** function with dates.

Syntax

min(list of items)

where:

list of items	Is an arbitrary listing of literal numbers, cells, ranges, regions, and/or external references.

Examples

min(a2,b3,c4,d5)

min(a2:b77)

min([Region A])

min(a1,c3,a2:b8,[Region A])

min(5,a7,{Spreadsheet A}[Region B])

The following spreadsheet lists the unit and dollar sales for three territories. To find the lowest number of units sold you would use the **min** function.

	A	B	C
1	TERRITORY	UNITS	DOLLARS
2	Chicago	34,000	84,660
3	Los Angeles	37,400	100,606
4	New York	42,300	105,327
5	LOWEST UNITS	= min(b2:b4)	

The following spreadsheet shows the results of the formula. The lowest number of units sold is 34,000 in Chicago.

	A	B	C	
1	TERRITORY	UNITS	DOLLARS	
2	Chicago	34,000	84,660	
3	Los Angeles	37,400	100,606	
4	New York	42,300	105,327	
5	LOWEST UNITS	= 34,000		

Mod — Finding the Remainder (Modulus)

Use the **mod** function to extract the remainder (modulus) after dividing one value by another.

Syntax

mod(dividend , divisor)

where:

dividend and divisor are single-cell references or any literal numbers.

Remarks

The **divisor** variable can be either positive or negative, but cannot be zero.

Examples

mod(a2,b3)

mod(37,-7)

mod(d4, .179)

Suppose you are the supervisor for a storage company. Because a warehouse can ship only full pallets containing the same product, you need to calculate the number of boxes that each pallet can hold and the number of remaining boxes that must be stored for later shipment.

To calculate the number of boxes that are not shipped because there are not enough products to completely fill another pallet, you would use the following spreadsheet.

	A	B	C	D	E	
1	Product Lot No.	Boxes Per Pallet	No. of Boxes	Pallets Needed	Boxes Remaining	
2	3476-90	= 4*4*4	231	= c2/b2	= mod(c2,b2)	
3	3522-22	= 5*6*4	417	= c3/b3	= mod(c3,b3)	
4	6319-08	= 4*3*6	315	= c4/b4	= mod(c4,b4)	
5	7010-77	= 5*4*6	719	= c5/b5	= mod(c5,b5)	

Column A lists each product lot number.

The formula in column B calculates how many boxes are shipped on each pallet.

Column C lists the number of boxes that are ready for shipment.

The formula in column D calculates the pallets needed. The number format for the column is set to truncate decimal places.

The formula in column E uses the **mod** function to calculate the number of boxes remaining after completely filling the pallets.

The following spreadsheet shows the results of the formulas.

	A	B	C	D	E	
1	Product Lot No.	Boxes Per Pallet	No. of Boxes	Pallets Needed	Boxes Remaining	
2	3476-90	= 64	231	= 3	= 39	
3	3522-22	= 120	417	= 3	= 57	
4	6319-08	= 72	315	= 4	= 27	
5	7010-77	= 120	719	= 5	= 119	

Round — Rounding a Value

Use **round** to round a number or cell value to a specific number of decimal places.

Syntax:

round(item , number of places)

where:

item	Is a single-cell reference or any literal number.
number of places	Is the number of places to the right of the decimal point.

Remarks

Entering a negative number for the **number of places** variable rounds the number to the left of the decimal point. For example, the formula round(343,-2) returns the value **300**.

Examples

round(a2,-2)

round(.179,1)

The following spreadsheet lists several products ready for delivery to a distributor. The distributor requires the approximate total weight in pounds for each item to calculate the shipping cost of each item, and the approximate total tonnage for the entire shipment to determine the type of truck necessary to transport the products.

	A	B	C	D	E
1	Product No.	Unit Wt. (lbs)	Unit Shipments	Total Wt. (lbs)	Total Wt. (tons)
2	3476-90	32.474	73	= round((b2*c2),2)	= round((d2/2000),1)
3	3522-22	81.566	51	= round((b3*c3),2)	= round((d3/2000),1)
4	6319-08	72.672	41	= round((b4*c4),2)	= round((d4/2000),1)
5	Total			= round(sum(d2:d4),0)	= round(sum(e2:e4),0)

If the Spreadsheet Options window is set to display the number rounded to a specified number of decimal places, the setting overrides the number of places that you enter for the **round** function. Only the number that is displayed is affected, not the value that is actually stored in the cell.

The result in cell d5 displays with two decimal places, even though the formula specified zero places, because the format of the cell is set to display with two decimal places.

	A	B	C	D	E
1	Product No.	Unit Wt. (lbs)	Unit Shipments	Total Wt. (lbs)	Total Wt. (tons)
2	3476-90	32.474	73	= 2,370.60	= 1.2
3	3522-22	81.566	51	= 4,159.87	= 2.1
4	6319-08	72.672	41	= 2,979.55	= 1.5
5	Total			= 9,510.00	= 5

Date and Time Functions

The Spreadsheet tool provides nine date and time functions. You can use date and time functions to:

- Specify the current date and time
- Extract components from dates and times and convert them to character strings
- Use character strings to create dates and times

The date and time functions are located in the **Date and Time** menu. Table 5 on page 85 lists each function and provides an example of its usage and a brief description. Detailed information about each date and time function follows. For more information, see “Using Dates in Formulas” on page 26 and “Entering Dates” on page 11.

Table 5. Date and time functions

Function	Syntax and Examples	Description
date	date(string to convert {, period })	Converts a string to a date.
	date('May 5, 1994',month) returns May, 1994	
datebuild	datebuild(year , month , day {, hour , minute , second })datebuild(1994,3, 23) returns March 23, 1994	Returns a date composed from the numbers specified in the argument.
datenum	datenum(date to count , smallperiod {,	Extracts a numeric value of a specified time period from a date of a larger time period.
	largeperiod })	
	datenum('Dec 31, 1994', day, year) returns 365 datenum('Dec 31, 1994', day) returns 31	
datespan	datespan(date to count , period d)	Counts the number of time periods in the specified date string.
	datespan('3Q94', month) returns 3	
datestr	datestr(date to convert , smallperiod {,	Extracts the date string of a specified time period from a date of a larger time period.
	largeperiod })	
	datestr('June 19, 1994', day, week) returns Sunday	
now	now(period) now(day) now(month)	Returns the current date with the specified resolution when you open or recalculate the spreadsheet.
period	period(date)	Finds the smallest time period in a date string.
	period('May 1, 1994') returns day period('May 1994') returns month	
timenum	timenum(hour , minute , second)	Converts a time specified in hours, minutes, and seconds to a fractional number.
	timenum(12, 0, 0) returns 0.5 for one-half day	
timestr	timestr(fraction of day {, clock })	Converts time from a fraction of a day to a string.
	timestr(4/24,24) returns 04:00:00	

Date — Converting a String to a Date

Use the **date** function to convert a string to a date.

Syntax

date(string to convert ,{ period })

where:

string to convert — Is a single-cell reference or an alphanumeric character string representing a time period, such as a month, day, and year.

period — Is an optional argument that specifies the time period of the returned date.

Remarks

The date string must be enclosed in quotation marks. For more information on date string format, see Table 1 on page 12.

If you do not specify a period, the **date** function returns the same precision as the string to convert.

Examples

date('July 19, 1994', year) returns 1994

date('July 19, 1994',month) returns July, 1994

date(a2)

date({Spreadsheet A} a4, month)

date(a1,day)

The following spreadsheet lists the dates on which three projects were assigned and the amount of time that is expected to complete them. To calculate the week in which each project is due, you would use the date function as shown in the formulas in column D.

	A	B	C	D
1	Project Name	Start Date	Time (weeks)	Completion Date
2	Zither	April 1, 1994	9	= date(b2,week) + c2
3	Harpsichord	May 1, 1994	2	= date(b3,week) + c3
4	Mandolin	June 1, 1994	7	= date(b4,week) + c4

By specifying the time period of the returned date as **week**, the start date is based on Sunday as the beginning of the week. Even though the start date is entered as April 1, 1994 (a Friday), the calculation uses the start date of Sunday, March 27, 1994.

The following spreadsheet provides the results of the formulas, returning the Sunday of the week that the projects should be completed.

	A	B	C	D
1	Project Name	Start Date	Time (weeks)	Completion Date
2	Zither	April 1, 1994	9	=week of May 29 1994
3	Harpsichord	May 1, 1994	2	=week of May 15 1994
4	Mandolin	June 1, 1994	7	= week of Jul 17 1994

Datebuild — Creating a Date from Numeric Values

Use the **datebuild** function to create a date and time string from a series of numbers.

Syntax

datebuild(year {, month , day , hour , minute , second })

where:

year	Is the year for the date you are building, such as 1994.
month	Is a number from 1 through 12, representing the months January through December.
day	Is a number from 1 through 31, representing the days of the month.
hour	Is a number from 0 through 24. Hours are based on a 24-clock where 0 through 12 are the morning hours (AM) and 13 through 24 are the evening hours (PM).
minute and second	Are numbers from 0 through 59.

Remarks

All arguments are single-cell references or integers.

The year can also be a number from 0 through 199, which represents the years 1900 through 2099.

When specifying the month, if the number is greater than 12, the year advances and the months wrap accordingly. For example, datebuild(1994,14) returns February, 1995.

When specifying the day, if the number is greater than the number of days in the specified month, the month and days advance accordingly. For example, datebuild(1994,4,31) returns May 1, 1994.

When specifying the hour, if the number is greater than 24, the time advances to the next day. For example, datebuild(1994,4,3 ,27) returns May 1, 1994 03:00.

When specifying the minute and second, if the number is greater than 59, the time advances accordingly. For example, datebuild(1994,4,3 ,22,59,6) returns April 30, 1994 23:00:00.

Examples

datebuild(94,1 ,31)

datebuild(94,2,3,4,2)

datebuild(a1,a2,b3)

The following spreadsheet is a payroll schedule in which employees are paid every 15 days, beginning on January 15, 1994 (calculated by the **datebuild** formula in cell A1). The **datenum** function calculates the numeric values for the next year, month, and day based on the previous pay date. The results of the **datenum** functions are used in the **datebuild** function to calculate the next pay date. The **datestr** function is included in

column B as a checkpoint for the Payroll department, so that checks can be issued early for pay dates that fall on a weekend.

	A	B
1	= datebuild(94,1,15)	= datestr(a1,day,week)
2	= datebuild(datenum(a1,year),datenum(a1,month),datenum(a1,day) + 15)	= datestr(a2,day,week)
3	= datebuild(datenum(a2,year),datenum(a2,month),datenum(a2,day) + 15)	= datestr(a3,day,week)
4	= datebuild(datenum(a3,year),datenum(a3,month),datenum(a3,day) + 15)	= datestr(a4,day,week)
5	= datebuild(datenum(a4,year),datenum(a4,month),datenum(a4,day) + 15)	= datestr(a5,day,week)
6	= datebuild(datenum(a5,year),datenum(a5,month),datenum(a5,day) + 15)	= datestr(a6,day,week)

The following spreadsheet shows the results of the formulas. For the first two pay dates, the checks would need to be issued on the Friday before the calculated date on January 14 and 28.

	A	B
1	= January 15, 1994	= Saturday
2	= January 30, 1994	= Sunday
3	= February 14, 1994	= Monday
4	= March 1, 1994	= Tuesday
5	= March 16, 1994	= Wednesday
6	= March 31, 1994	= Thursday

Datenum — Converting a Date to a Numeric Value

Use the **datenum** function to extract a numeric value of a specified time period from a date of a larger time period.

Syntax

datenum(date to count , smallperiod {, largeperiod })

where:

date to count	Is a single-cell reference that contains a date or an alphanumeric character string representing a time period, such as a month, day, and year.
smallperiod	Specifies the time period of the returned number. For example, datenum('May 15, 1994', day) returns 15 because May 15 is the fifteenth day of the month.
largeperiod	Is an optional argument that specifies a larger time period from which to extract the smaller time period. For example, datenum('May 15, 1994', day, year) returns 135 because May 15 is the 135th day of the year.

Remarks

A date string must be enclosed in quotation marks. For more information on date string format, see Table 1 on page 12.

Allowable values for smallperiod are: second, minute, hour, day, week, qweek, month, bimonth, ebimonth, and quarter.

Allowable values for largeperiod are the same as for smallperiod plus year. The value must be equal to or larger than the smallperiod value or the calculation returns an error.

Examples

datenum('July 19, 1994', quarter, year) returns 3

datenum({Spreadsheet A} a4, month)

datenum(a1,day)

datenum('July 19, 1994', day) returns 19

Suppose you have the following spreadsheet that calculates employee sales bonuses. An employee is paid a full bonus (100%) if the sale is completed before the middle of the month, and a half bonus (50%) if the sale is completed by the end of the month. You would use the **datenum** function in an **if** statement to calculate the bonus percentages.

	A	B	C
1	Employee	Sale Closing Date	Bonus (percent)
2	Castle	02-14-94	=if(datenum(b2,day)<16,1,0.5)
3	Fennell	02-22-94	=if(datenum(b3,day)<16,1,0.5)
4	Graham	03-29-94	=if(datenum(b4,day)<16,1,0.5)
5	Young	03-12-94	=if(datenum(b5,day)<16,1,0.5)

The following spreadsheet shows the results of the formulas.

	A	B	C
1	Employee	Sale Closing Date	Bonus (percent)
2	Castle	02-14-94	=100%
3	Fennell	02-22-94	=50%
4	Graham	03-29-94	=50%
5	Young	03-12-94	=100%

Datespan — Extracting a Numeric Value from a Date

Use the **datespan** function to extract the number of seconds, minutes, hours, days, weeks, months, or quarters from a specified date.

Syntax

datespan(date to count , period)

where:

date to count	Is a single-cell reference that contains a date or an alphanumeric character string representing a time period, such as a month, day, and year.
period	Is the time span for which the date is counted.

Remarks

A date string must be enclosed in quotation marks. For more information on date string format, see Table 1 on page 12.

The period must be a subset of the date to count. For example, datespan('March 3 , 1994', year) returns 0 because the date to count is a single day; datespan('March 3 , 1994', day) returns 1.

Examples

datespan('July 19, 1994', hours)

datespan(a2,days)

datespan({Spreadsheet A}a4,months)

The following spreadsheet uses the **datenum** function in cell A2 to calculate the number of the current day in the year. The **datespan** functions in column B calculate the number of days in each quarter of the calendar year. The formulas in column C calculate the days remaining from the current day to the end of each quarter.

	A	B	C
1	Current day in year	Days in quarter	Days remaining to end of quarter
2	=datenum(now(day), day,year)	=datespan(1Q94 ,days)	=if(a2>b2,0,b2-a2)
3		=datespan(2Q94 ,days)	=if(!a!2>sum(!b!2:b3),0,sum(!b!2:b3)-!a!2
4		=datespan(3Q94 ,days)	=if(!a!2>sum(!b!2:b4),0,sum(!b!2:b4)-!a!2
5		=datespan(4Q94 ,days)	=if(!a!2>sum(!b!2:b5),0,sum(!b!2:b5)-!a!2

The following spreadsheet shows the results of the formulas assuming that the current date is April 21, 1994. You would click on the **Recalculate** button to update the spreadsheet to the current day.

	A	B	C
1	Current day in year	Days in quarter	Days remaining to end of quarter
2	=111	=90	=0
3		=91	=70
4		=92	=162
5		=92	=254

Datestr — Converting a Date to a String

Use the **datestr** function to extract a date of a specified time period from a date of a larger time period.

Although the syntax for the **datenum** function is similar to the syntax for the **datestr** function, the **datenum** function returns a numeric value for the specified time period; the datestr function returns a string for a specified time period. For example, datenum('Feb 4, 1994', day) returns the number 4; datestr('Feb 4, 1994', day) returns the string 4.

Syntax

datestr(date to convert , smallperiod {, largeperiod })

where:

date to convert	Is a single-cell reference that contains a date or an alphanumeric character string representing a time period, such as a month, day, and year.
smallperiod	Specifies the time period of the returned number. For example, datestr('May 15, 1994',day) returns the string 15 because May 15 is the fifteenth day of the month.
largeperiod	Is an optional argument that specifies a larger time period from which to extract the smaller time period. For example, datestr('May 15, 1994', day, year) returns 135 because May 15 is the 135th day of the year.

Remarks

A date string must be enclosed in quotation marks. For more information on date string format, see Table 1 on page 12.

Allowable values for smallperiod are: second, minute, hour, day, week, qweek, month, bimonth, ebimonth, and quarter.

Allowable values for largeperiod are the same as for smallperiod plus year. The value must be equal to or larger than the smallperiod value or the calculation returns an error.

Examples

datestr('July 19, 1994', quarter, year) returns the string 3

datestr({Spreadsheet A}a4,month)

datestr(a1,day)

datestr('July 19, 1994', day) returns the string 19

The following spreadsheet is a payroll schedule in which employees are paid every 15 days, beginning on January 15, 1994 calculated by the **datebuild** function in cell a1. The **datestr** function is included in column B for the Payroll department so that checks can be issued early for pay dates that fall on a weekend.

	A	B
1	=datebuild(94,1,15)	=datestr(a1,day,week)
2	=a1+15	=datestr(a2,day,week)
3	=a2+15	=datestr(a3,day,week)
4	=a3+15	=datestr(a4,day,week)
5	=a4+15	=datestr(a5,day,week)
6	=a5+15	=datestr(a6,day,week)

The following spreadsheet shows the results of the formulas. For the first two pay dates, the checks would have to be issued on the Fridays before the calculated dates, January 14 and 28.

	A	B
1	=January 15, 1994	=Saturday
2	=January 30, 1994	=Sunday
3	=February 14, 1994	=Monday
4	=March 1, 1994	=Tuesday
5	=March 16, 1994	=Wednesday
6	=March 31, 1994	=Thursday

Now — Calculating the Current Date and Time

Use the **now** function to calculate the current date, time, or both. The date and time are updated each time the spreadsheet is recalculated. You can use the **now** function to timestamp work that you calculate on a regular basis, such as a daily report.

Syntax

now(period)

where:

period — A single cell reference or a string representing a time period. For example, **now(year)** returns the current year.

Examples

now(year)

now(a2)

The following spreadsheet shows an example of the **now** function using each of the acceptable time periods.

	A
1	=now(second)
2	=now(minute)
3	=now(hour)
4	=now(day)
5	=now(week)
6	=now(qweek)
7	=now(month)
8	=now(bimonth)
9	=now(ebimonth)
10	=now(quarter)
11	=now(year)

The following spreadsheet shows the results of the formulas, assuming that the formulas were recalculated at the same date and time.

	A
1	=April 21, 1994 09:22:19
2	=April 21, 1994 09:22
3	=April 21, 1994 09
4	=April 21, 1994
5	=week of April 17, 1994
6	=quad week of April 17, 1994
7	=April, 1994
8	=AM, 1994
9	=MA, 1994
10	=2Q1994
11	=1994

Period — Finding the Smallest Time Period in a Date

Use the **period** function to extract the smallest time period in a date string.

Syntax

period(date)

where:

date — Is single-cell reference that contains a date, or an alphanumeric character string representing a time period, such as a month, day, and year.

Remarks

A date string must be enclosed in quotation marks. For more information on date string format, see Table 1 on page 12.

Examples

period('July 19, 1994')

period(a2)

The following spreadsheet lists the dates representing each of the acceptable Spreadsheet date and time periods. The formulas in column B use the **period** function to extract the smallest period from each of the dates in column A.

	A	B
1	April 21, 1994 09:22:19	=period(a1)
2	April 21, 1994 09:22	=period(a2)
3	April 21, 1994 09	=period(a3)
4	April 21, 1994	=period(a4)
5	week of April 17, 1994	=period(a5)
6	quad week of April 17, 1994	=period(a6)
7	April, 1994	=period(a7)
8	AM, 1994	=period(a8)
9	MA, 1994	=period(a9)
10	2Q1994	=period(a10)
11	1994	=period(a11)

The following spreadsheet shows the results of the formulas.

	A	B
1	April 21, 1994 09:22:19	=second
2	April 21, 1994 09:22	=minute
3	April 21, 1994 09	=hour
4	April 21, 1994	=day
5	week of April 17, 1994	=week
6	quad week of March 27, 1994	=quadweek
7	April, 1994	=month
8	AM, 1994	=bimonth
9	MA, 1994	=ebimonth
10	2Q1994	=quarter
11	1994	=year

Timenum — Converting Time to a Fractional Value

Use the **timenum** function to convert a time specified in hours, minutes, and seconds to a fractional number.

Syntax

timenum(hour , minute , second)

where:

hour	Is a number from 0 through 24, either positive or negative.
minute and second	Are numbers from 0 through 59, either positive or negative.

Remarks

If hour is greater than 24, the time advances to the next day and the fraction increases accordingly. For example, timenum(27, ,) returns 1.13.

If minute or second is greater than 59, the time advances to the next hour or minute and the fraction increases accordingly. For example, timenum(13,7 ,85) returns 0.59.

Examples

timenum(23,7,3)

timenum(a2,b3,c4)

timenum(-12,2 ,17)

The following spreadsheet lists project completion times in hours, minutes, and seconds for four employees. The formulas in column E convert the times into a fractional part of a work day. Since the **timenum** function calculations are based on the 24-hour clock, the formulas in column E are multiplied by 3 to account for an 8-hour work day.

	A	B	C	D	E
1	Employee	Hours	Minutes	Seconds	Fraction of workday
2	Curcin	2	32	17	=timenum(b2,c2,d2)*3
3	Graham	3	1	15	=timenum(b3,c3,d3)*3
4	Murdock	3	59	43	=timenum(b4,c4,d4)*3
5	Wright	3	25	17	=timenum(b5,c5,d5)*3

The following spreadsheet shows the results of the formulas.

	A	B	C	D	E
1	Employee	Hours	Minutes	Seconds	Fraction of workday
2	Curcin	2	32	17	=0.317
3	Graham	3	1	15	=0.377
4	Murdock	3	59	43	=0.498
5	Wright	3	25	17	=0.427

Timestr — Converting Time to a Character String

Use the **timestr** function to convert a time to a string.

Syntax

timestr(fraction of day {, clock })

where:

fraction of day	Is a single-cell reference or any literal number divided by 24.
clock	Is an optional argument that specifies either a 12- or 24-hour clock.

Remarks

The **fraction of a day** variable can also be a formula using the **fract** function, as described on “Fract — Extracting the Fractional Part of a Number” on page 76. For example, the formula timestr(fract(date('August 9, 1994 18: ')),12) returns 6:00:00 pm.

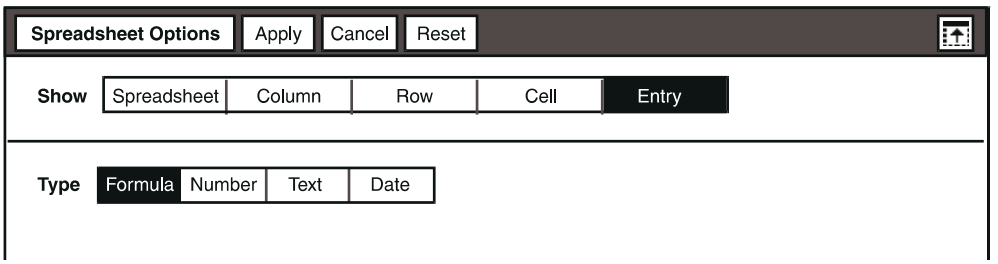
Examples

timestr(a2/24,12)

timestr(({Spreadsheet A}a4)/24,24)

timestr(4/24,12)

The spreadsheet on the left shows examples of formulas using **timestr** to convert the time based on both a 12-hour and a 24-hour clock. The spreadsheet on the right shows the results of the formulas.



Financial Functions

The Spreadsheet tool provides five financial functions. Financial functions are located in the **Finance** menu. Table 6 lists each function and provides an example of its usage and a brief description. Detailed information about each financial function follows.

Table 6. Financial functions

Function	Syntax	Examples	Description
cirr	cirr(range)	cirr(a7:a19) cirr([Region A])	Returns the continuous internal rate of return for a time-series range of cells.
fv	fv(pmt , rate , per)	fv(100, 0.105,10) fv(d5,g7,h8)	Returns the future value of an annuity at a given rate for a specified number of periods.
irr	irr(range)	irr(a7:a19) irr([Region A])	Returns the internal rate of return for a series of cash flows.
npv	npv(rate , range)	npv(0.09,a1:a7)	Returns the net present value of a specified stream of future payments at a given rate.
pv	pv(pmt , rate , per)	pv(10,0.105,10) pv(d5, g7, h8)	Returns the present value of a specified periodic payment at a given rate for a specified number of periods.

Cirr — Calculating Continuous Internal Rate of Return

Use the **cirr** function to find the continuous internal rate of return for a time-series range of cells, where **cirr=log$_e$ (1+irr)**. You can use the **cirr** function when you have individual cash flows that occur continuously during the year.

Syntax

cirr(range)

where:

range Is a time-series range of cells that must have at least one sign change.

Remarks

Discounting begins with the second cell in the range.

If the range contains a blank cell, an error value is returned.

Examples

cirr(a7:a19)

cirr([Region A])

Suppose you have the following spreadsheet containing the expected cash flows for an investment over 5 years. The first value is negative because it represents the initial cash investment. You can calculate the continuous internal rate of return using the formula cirr(A2:A6). The spreadsheet on the right shows the results of the formula (.04) formatted with the percent symbol, which automatically multiplies it by 100.

	A	B	
1	CASH FLOW		
2	(50,000)		
3	10,000		
4	20,000		
5	10,000		
6	15,000		
7	CIRR	= cirr(A2:A6)	

	A	B	
1	CASH FLOW		
2	(50,000)		
3	10,000		
4	20,000		
5	10,000		
6	15,000		
7	CIRR	= 3.78%	

Fv — Calculating Future Value

Use the **fv** function to calculate the future value of an annuity (an investment in which all payments are equal) at a set interest rate for a specified number of periods. You can use **fv** to calculate the amount of money you will receive from a time-deposit account at the end of a specified period after making equal monthly deposits.

Syntax

fv(pmt , rate , per)

where:

pmt Is the amount of the periodic payment.

rate Is the periodic interest rate that the investment earns, where rate is >=0.

per Is the number of periods over which the money is invested.

Remarks

The variables pmt, rate, and per are single-cell references, literal numbers, or a calculation, such as d7/6 (to calculate a rate).

The per variable must be a whole number.

Examples

```
fv(1  , .1 5,1 )

fv(d5,g7,h8)

fv(d5,(g7/12),h8)
```

The following spreadsheet calculates the amount of money you would receive at the end of 5 years (60 months) if you invest $300.00 per month at an interest rate of 7 percent compounded quarterly. The interest rate is divided by 20 because the interest is compounded every three months (quarterly) during the 60-month period.

	A	B
1	Monthly Investment	300.00
2	Interest Rate	7%
3	Period of Investment (months)	60
4	Future Value	= fv(b1,(b2/20),b3)

The following spreadsheet provides the results of the formula.

	A	B
1	Monthly Investment	300.00
2	Interest Rate	7%
3	Period of Investment (months)	60
4	Future Value	= 19,990.78

Irr — Calculating Internal Rate of Return

Use the **irr** function to find the internal rate of return for a series of cash flows. You can use **irr** when you have several investment choices and you want to know at what interest rate each initial investment will equal the expected future cash flow.

Syntax

```
irr( range )
```

where:

range Is a time-series range of cells that must have at least one sign change.

Remarks

Discounting begins with the second cell in the range.

If the range contains a blank cell, an error value is returned.

The **irr** function only returns values between 0 and 1. Any other result returns an error value.

Examples

irr(a7:a19)

irr([Region A])

The following spreadsheet shows the expected cash flows for an investment over 5 years. The first value flow is negative because it represents the initial cash investment. You can calculate the internal rate of return using the formula irr(a2:a6). The spreadsheet on the right shows the results of the formula (.04) formatted with the percent symbol, which automatically multiplies it by 100.

	A	B	
1	CASH FLOW		
2	(50,000)		
3	10,000		
4	20,000		
5	10,000		
6	15,000		
7	IRR	= irr(a2:a6)	

	A	B	
1	CASH FLOW		
2	(50,000)		
3	10,000		
4	20,000		
5	10,000		
6	15,000		
7	IRR	= 3.85%	

Npv — Calculating Net Present Value

Use the **npv** function to calculate the value of a stream of future payments discounted back to the current date at a given interest rate. You can use **npv** to calculate which investment gives you the highest return.

Syntax

npv(rate , range)

where:

rate	Is the periodic interest rate that the payments earn, where rate is >=0 and <=1.
range	Is a time-series range of cells that represents the cash flow for a given time period.

Remarks

Discounting begins with the first cell in the range.

Examples

npv(.12,d4:d1)

npv(.1,[Region A])

The following spreadsheet calculates the net present value for a series of payments made at quarterly intervals for one year. The interest rate is 11 percent compounded quarterly. The interest rate (b3) is divided by 4 to account for the quarterly compounding rate.

	A	B	C	D	E
1	Quarterly Investments	January	April	July	October
2	Interest Rate	10,000.00	5,000.00	10,000.00	5,000.00
3	NPV	11%			
4		= npv(b3/4,b2:e2)			

The following spreadsheet provides the results of the formula.

	A	B	C	D	E
1	Quarterly Investments	January	April	July	October
2	Interest Rate	10,000.00	5,000.00	10,000.00	5,000.00
3	NPV	11%			
4		= 28,172.51			

Pv — Calculating Present Value

Use the **pv** function to calculate the present value of an investment. The **pv** function assumes that you make equal payments at a set interest rate over a specific period of time. You can use **pv** to calculate the initial value of an investment.

Syntax

pv(pmt , rate , per)

where:

pmt — Is the amount of the periodic payment.

rate — Is the periodic interest rate, where rate is >=0.

per — Is the number of periods over which payments are made.

Remarks

The variables pmt, rate, and per are single-cell references, literal numbers, or a calculation, such as d7/6 (to calculate a rate).

The per variable must be a whole number.

Examples

pv(1 , .1 5,1)

pv(d5,g7,h8)

For example, the spreadsheet on the left calculates how much you can afford to spend for a new car based on the following known values.

The maximum monthly loan payment you can afford is $250.00.

You can get a 5-year loan (60 months) at an interest rate of 9.9 percent compounded monthly.

You would use the formula pv(b1,b2,b3) to calculate the total amount you can afford to pay for a new car. The spreadsheet on the right displays the results of the formula, which shows you can afford to spend $11,793.64 for a new car.

	A	B	
1	Monthly Payment	250.00	
2	Interest Rate	= .099/12	
3	Loan Term	60	
4	Present Value of car	= pv(b1,b2,b3)	

	A	B	
1	Monthly Payment	250.00	
2	Interest Rate	= 0.00825	
3	Loan Term	60	
4	Present Value of car	= 11,793.64	

String Functions

The Spreadsheet tool provides 14 string functions. You can use string functions to:

Compare strings in conditional expressions

Manipulate strings by changing the order of words, adding or removing words, or concatenating several strings

Convert characters to numeric values or numbers to strings

Remove spaces or tabs from the ends of strings

Repeat strings to create a pattern

The string functions are located in the **Strings** menu. Table 7 on page 103 lists each function and provides an example of its usage and a brief description. Detailed information about each string function follows.

Table 7. String functions

Function	Syntax and Example	Description
case	case(string , type of capitalization) case('SANGER BEVERAGES', 'i') returns Sanger Beverages	Returns a string capitalized according to the specified type.
clean	clean(string , end of string to clean) clean(' 07203', 'L') returns 07203	Removes spaces and tabs at the specified end of a string.
concat	concat(list of strings) concat('Alamo', ', ', 'CA') returns Alamo, CA	Combines several strings into one string.
edit	edit(oldstring , newstring to insert {, start in oldstring , characters to remove }) edit('Improved Bar Soap', 'New',1) returns New Improved Bar Soap	Inserts a new string into an old string at a specified character position.
exact	exact(string1 , string2) exact('ThickMark Ink Pens', 'ThickMark Pens') returns False	Returns **True** if two specified strings are identical; otherwise, returns **False**.
find	find(string to search , string to find {, character start position }) find('Goldtie Dress Accessories', 'ss', 14) returns 19	Locates the position of a specified string within another string.
left	left(string , number of characters to return from left) left('Alex Curcin', 4) returns Alex	Returns the specified number of characters from the left end of a string.
len	len(string) len('Tenstyle Speed Bikes') returns 20	Counts the number of characters in a string.
mid	mid(string , starting point in string , number of characters to return) mid('Gyroder Top Spinners', 9, 3) returns Top	Extracts a character sequence from a specified start position in a string and returns the specified number of characters.
repeat	repeat(string , number of times) repeat('***', 4) returns **********	Repeats the specified string pattern a specified number of times.
right	right(string , number of characters to return from right) right('Beverly Hills, CA 90210', 5) returns 90210	Returns the specified number of characters from the right end of the string.
rotate	rotate(string , positive or negative number of characters to shift) rotate('MasterPiece', 6) returns PieceMaster	Shifts the specified characters from the right or left end of a string to the opposite end.
string	string(number to convert to a string {, number of decimal places }) string(193.453,2) returns 193.45 as text	Converts a number to a text string.
val	val(string) val('1994') returns 1994 as a number	Converts a text string to a number. If the string cannot be converted to a number, the number zero is returned.

Case — Changing the Letter Case in a String

Use the **case** function when you want to change the uppercase and lowercase characters in a string.

Syntax

case(string , type of capitalization)

where:

string	Is a character string or a single-cell reference that contains a character string.
type of capitalization	Specifies the case change that you want to make. It can be a character string or a single-cell reference that contains a character string. The following type of capitalization can be specified: **U** changes the string to all uppercase letters. **I** changes the first letter of each word in the string to an uppercase letter and all other letters in the string to lowercase (initial capitalization). **L** changes the string to all lowercase letters. **C** reverses the case of all letters in the string; all uppercase letters become lowercase and all lowercase letters become uppercase.

Remarks

The letter specifying the type of capitalization must be contained in quotation marks and can be either uppercase or lowercase.

Examples

case('FLOTIDROP Eye Solution', 'I')

case(a3, 'u')

case(a3, c1)

case('SANGER BEVERAGES', 'L')

In the following example, the spreadsheet on the left lists a company's product name, ZIP roller skates, in cell a1. Column B contains the formulas for changing the case of the text using each of the capitalization options. The spreadsheet on the right displays the result of the formulas.

	A	B
1	ZIP roller skates	=case(a1, U)
2		=case(a1, I)
3		=case(a1, L)
4		=case(a1, C)

	A	B
1	ZIP roller skates	=ZIP ROLLER SKATES
2		=Zip Roller Skates
3		=zip roller skates
4		=zip ROLLER SKATES

To change the case of a string, you can also use two functions that are not located in the **Strings** menu:

upper(string) converts a string to all uppercase

lower(string) converts a string to all lowercase

These functions have been included for compatibility with Lotus spreadsheets.

Clean — Removing Spaces and Tabs from the End of a String

Use the **clean** function to remove spaces, tabs, or both from a specified end of a character string. For example, you can use **clean** when you have entered a number as text by adding a space to it, and want to use the same entry as a number in another cell.

Syntax

clean(string , end of string to clean)

where:

string	Is a character string or a single-cell reference that contains a character string.
end of string to clean	Specifies which end of the string to clean. It can be a single character string or a single-cell reference that contains a character string. The following can be specified: **R** cleans the right end of the string **L** cleans the left end of the string. **B** cleans both ends of the string

Remarks

The letter specifying the end of the string to clean must be contained in quotation marks and can be either uppercase or lowercase.

Examples

clean('Rollem Film Products ', 'R')

clean(a7,b2)

clean(a1,'B')

clean(' 72 3 ', 'r')

In the following example, the spreadsheet shown on the left contains the names of the sales representatives for a company. Extra spaces appear at the beginning of the entries for Norton and Williams, and possibly at the end of all of the entries. You need to remove the spaces so that the spreadsheet does not cause errors in future applications. You would use the formulas in column B to remove the spaces from both ends of the entries. The spreadsheet on the right shows the results of the formulas.

	A	B
1	Representatives	
2	Norton	=clean(a2, B)
3	Murdock	=clean(a3, B)
4	Williams	=clean(a4, B)
5	Berg	=clean(a5, B)

	A	B
1	Representatives	
2	Norton	=Norton
3	Murdock	=Murdock
4	Williams	=Williams
5	Berg	=Berg

Concat — Concatenating Strings

Use the **concat** function to combine the character strings from several cells into one cell. For example, you can use **concat** to combine cells in columns that contain names and addresses. **Concat** is an aggregate function, so you can choose to ignore error and N/A values in the calculation, as described in “Ignoring Error and N/A Values in Aggregate Functions” on page 31.

Syntax

concat(list of strings)

where:

list of strings — Is an arbitrary list of character strings, single-cell references that contain character strings, cell ranges, regions, or external references that contain character strings.

Remarks

Spaces and commas are not automatically included in the concatenated string; you must specifically enter them within quotes in the argument. For example, the formula concat('Bozeman', 'MT') returns BozemanMT, without any spaces or commas. To return Bozeman, MT, use the formula concat('Bozeman',', ','MT').

Examples

concat(a1:c1)

concat(a1,{Spreadsheet A}a1)

concat([Region A])

concat('Winnemucca',', ','NV',' ',a2)

In the following example, the spreadsheet on the left lists several cities located in California. The formulas in column B use the **concat** function to combine the individual city listings with the state. The formulas include the comma and space following the city name. The spreadsheet on the right shows the results of the formulas.

	A	B
1	CA	
2	Los Angeles	=concat(a2, ", ", a1)
3	Aptos	=concat(a3, ", ", a1)
4	Pasadena	=concat(a4, ", ", a1)
5	Redlands	=concat(a5, ", ", a1)

	A	B
1	CA	
2	Los Angeles	=Los Angeles, CA
3	Aptos	=Aptos, CA
4	Pasadena	=Pasadena, CA
5	Redlands	=Redlands, CA

Edit — Inserting a New String into an Existing String

Use the **edit** function to insert new characters, replace old characters, or both in an existing string. You can use **edit** with the **find** function to locate the character position where you want to insert the new string.

Syntax

edit(oldstring **,** newstring to insert {, start in oldstring , characters to remove })

where:

oldstring and newstring to insert	Are character strings or single-cell references that contain a character string.
start in oldstring	Is the number of characters from the left, including spaces, where the newstring is inserted.
characters to remove	Is the number of characters to delete from the existing string, including spaces, beginning at the character position specified in the **start in oldstring** argument.

Remarks

If you do not specify a value for the optional arguments **start in oldstring** and **characters to remove**, the **newstring** is appended to the end of the **oldstring**.

Examples

edit('Bidom Dog Biscuits', 'Edum', 1, 5)

edit(a1,b1,c1)

edit(b7,'Magic',6,11)

edit('Improved Bar Soap','New ',1)

The following spreadsheet lists stain removal products for several companies. Recently, the Clesco Company changed the name of its product from Clesco Stain Fighter to Clesco Household Cleaner. The PolyOut and Snapper companies merged and changed the name of their product line to SnapOut. You would use the **edit** and **find** functions to make the name changes for the stain removal products.

	A	B
1	Clesco Stain Fighter (8 oz.)	=edit(a1,"Household Cleaner",(find(a1,"Stain Fighter")),13)
2	Clesco Stain Fighter (16 oz.)	=edit(a2,"Household Cleaner",(find(a2,"Stain Fighter")),13)
3	Clesco Stain Fighter (36 oz.)	=edit(a3,"Household Cleaner",(find(a3,"Stain Fighter")),13)
4	PolyOut Stain Kill (24 oz.)	=edit(edit(a4,"SnapOut",(find(a4,"PolyOut")),7),"Remedy",(find(a4,"Kill")) ,4)
5	Snapper Stain Eater (8 oz.)	=edit(edit(a5,"SnapOut",(find(a5,"Snapper")),7),"Remedy",(find(a5, "Eater")),5)
6	Snapper Stain Eater (12 oz.)	=edit(edit(a6,"SnapOut",(find(a6,"Snapper")),7),"Remedy",(find(a6, "Eater")),5)

You would use the **find** function to identify the **start in oldstring** argument for the **edit** function, instead of counting the characters in each product. The formulas can be replicated to update a list of products that includes several hundred items. The following spreadsheet shows the results of the formulas.

	A	B
1	Clesco Stain Fighter (8 oz.)	=Clesco Household Cleaner (8 oz.)
2	Clesco Stain Fighter (16 oz.)	=Clesco Household Cleaner (16 oz.)
3	Clesco Stain Fighter (36 oz.)	=Clesco Household Cleaner (36 oz.)
4	PolyOut Stain Kill (24 oz.)	=SnapOut Stain Remedy (24 oz.)
5	Snapper Stain Eater (8 oz.)	=SnapOut Stain Remedy (8 oz.)
6	Snapper Stain Eater (12 oz.)	=SnapOut Stain Remedy (12 oz.)

Exact — Comparing Strings

Use the **exact** function to compare two character strings. If the strings match exactly, the formula returns **True**; if they do not match, the formula returns **False**. Strings match only if their capitalization is identical.

Syntax

exact(string1 , string2)

where:

string1 and string2	Are character strings or single-cell references containing character strings.

Examples

exact('ThickMark Ink Pens', 'Thickmark Ink Pens')

exact(a1, a2)

exact(a1, 'Sudso Detergent')

exact(a1, {Spreadsheet A}a1)

Suppose you have the following spreadsheet listing the sales representatives and installers for an equipment company. The sales representatives receive a 10 percent bonus for every equipment sale. If they also install the equipment, they receive a 20 percent bonus. Columns A and B list the sales representatives and the installers, respectively. You would use the formulas in column C to change the names to all uppercase and compare the entries for an exact match. You would then use the formulas in column D to calculate the appropriate bonus, based on the formula results in column C.

	A	B	C	D
1	Salesperson	Installer	Same Person	Bonus (percent)
2	Farber	FARBER	=exact(case(a2, "U"), case(b2, "U"))	=if(c2, 0.2, 0.1)
3	Keegan	Valentino	=exact(case(a3, "U"), case(b3, "U"))	=if(c3, 0.2, 0.1)
4	Williams	Wright	=exact(case(a4, "U"), case(b4, "U"))	=if(c4, 0.2, 0.1)
5	Wright	wright	=exact(case(a5, "U"), case(b5, "U"))	=if(c5, 0.2, 0.1)

The following spreadsheet displays the results of the formulas.

	A	B	C	D
1	Salesperson	Installer	Same Person	Bonus (percent)
2	Farber	FARBER	=True	=20%
3	Keegan	Valentino	=False	=10%
4	Williams	Wright	=False	=10%
5	Wright	wright	=True	=20%

Find — Finding a Character Sequence Within a String

Use the **find** function to locate the position of a specified character sequence within a character string. You can use **find** with the **edit** function to locate the character position where you want to insert a new string. The **find** function is case sensitive. If a match is not found, an error is returned.

Syntax

find(string to search , string to find {, character start position })

where:

string to search and string to find	Are character strings or single-cell references containing character strings.
character start position	Is the optional number of characters from the left, including spaces, where you want the search to begin. If you do not enter a value, the search begins with the first character.

Examples

find(b12, 'Dress')

find(b12, c1)

find('Goldtie Dress Accessories', 'ss', 14)

find(c13, {Spreadsheet A}c3)

The following spreadsheet lists stain removal products for several companies. Recently, the Clesco Company changed the name of its product from Clesco Stain Fighter to Clesco Household Cleaner. The PolyOut and Snapper companies merged and changed the name of their product line to SnapOut. You would use the **find** and **edit** functions to make the name changes for the stain removal products.

	A	B
1	Clesco Stain Fighter (8 oz.)	=edit(a1,"Household Cleaner",(find(a1,"Stain Fighter")),13)
2	Clesco Stain Fighter (16 oz.)	=edit(a2,"Household Cleaner",(find(a2,"Stain Fighter")),13)
3	Clesco Stain Fighter (36 oz.)	=edit(a3,"Household Cleaner",(find(a3,"Stain Fighter")),13)
4	PolyOut Stain Kill (24 oz.)	=edit(edit(a4,"SnapOut",(find(a4,"PolyOut")),7),"Remedy",(find(a4,"Kill")) ,4)
5	Snapper Stain Eater (8 oz.)	=edit(edit(a5,"SnapOut",(find(a5,"Snapper")),7),"Remedy",(find(a5, "Eater")),5)
6	Snapper Stain Eater (12 oz.)	=edit(edit(a6,"SnapOut",(find(a6,"Snapper")),7),"Remedy",(find(a6, "Eater")),5)

You would use the **find** function to identify the **start in oldstring** argument for the **edit** function, instead of counting the characters in each product. The formulas can be replicated to update a list of products that includes several hundred items. The following spreadsheet shows the results of the formulas.

	A	B
1	Clesco Stain Fighter (8 oz.)	=Clesco Household Cleaner (8 oz.)
2	Clesco Stain Fighter (16 oz.)	=Clesco Household Cleaner (16 oz.)
3	Clesco Stain Fighter (36 oz.)	=Clesco Household Cleaner (36 oz.)
4	PolyOut Stain Kill (24 oz.)	=SnapOut Stain Remedy (24 oz.)
5	Snapper Stain Eater (8 oz.)	=SnapOut Stain Remedy (8 oz.)
6	Snapper Stain Eater (12 oz.)	=SnapOut Stain Remedy (12 oz.)

Left — Extracting Characters from the Left End of a String

Use **left** to extract a character sequence from the left end of a character string.

Syntax

left(string , number of characters to return)

where:

string	Is a character string or a single-cell reference that contains a character string.
number of characters to return	Specifies the number of characters that you want to return from the left end of the specified string.

Examples

left('Clyde Dale's Footwear',12)

left(a2,9)

left({Spreadsheet A}a2,5)

left('Mountain View, CA 94 43',13)

Suppose you have the following spreadsheet listing several companies in the garden and farm products industries. To extract the company names from the product list, you would use the **left** function. You would use the **find** function to identify the number of characters to return from the left by locating the first blank space that follows each company name.

	A	B
1	Lite Gauge Farm Products	=left(a1, (find(a1, " ", 6)))
2	MacroBin Farm Products	=left(a2, (find(a2, " ")))
3	Masterduct Farm Products	=left(a3, (find(a3, " ")))
4	Termipod Garden Products	=left(a4, (find(a4, " ")))

The following spreadsheet shows the results of the formulas.

	A	B
1	Lite Gauge Farm Products	=Lite Gauge
2	MacroBin Farm Products	=MacroBin
3	Masterduct Farm Products	=Masterduct
4	Termipod Garden Products	=Termipod

Len — Counting the Number of Characters in a String

Use the **len** function to count the number of characters in a string.

Syntax

len(string)

where:

string	Is a character string or a single-cell reference that contains a character string.

Examples

len(b12)

len({Spreadsheet A}d4)

len(Ferrotable Magnetic Products)

Quotes are ignored in the **len** function.

The following spreadsheet lists several publishing companies. Each company is having its name printed on baseball caps. The names printed on the caps can have a maximum of 22 characters. To calculate the length of each company name, you would use the **find** and **left** functions to extract the word Publishing, and then use the **len** function to count the number of characters remaining in the company name.

	A	B
1	ArchMags Publishing	=len(left(a1, (find(a1, "Pub")-2)))
2	Side Saddle & Stitch Publishing	=len(left(a2, (find(a2, "Pub")-2)))
3	Zebra Pulp Publishing	=len(left(a3, (find(a3, "Pub")-2)))

The following spreadsheet shows the results of the formulas.

	A	B
1	ArchMags Publishing	=8.00
2	Side Saddle & Stitch Publishing	=20.00
3	Zebra Pulp Publishing	=10.00

Mid — Extracting Characters from a String

Use the **mid** function to extract a character sequence from within a character string. You can use **mid** when the **left** and **right** functions extract characters at either end of the string that you do not want.

Syntax

mid(string , starting point in string , number of characters to return)

where:

string	Is a character string or a single-cell reference that contains a character string.
starting point in string	Specifies the number of characters from the left, including spaces, where you want the extraction to begin.
number of characters to return	Specifies the number of characters to return from the string.

Remarks
If a negative value is specified for the **starting point in string** or **number of characters to return** arguments, the entire string is returned.

Examples
mid('Gyroder Top Spinners',9,3)

mid(a7,b7,c7)

mid(a7,3,4)

mid({Spreadsheet a}a3,5,6)

Suppose you have the following spreadsheet listing some of the products produced by the Yumbo Goodie Company. One of your applications needs only the candy type of the products, not the flavor. You would use the **mid** function with the **find** and **rotate** functions to extract the candy type from the middle of the product name.

	A	B
1	Yumbo Licorice - Cherry	=mid(a1, (find(a1, " ")+1), (find(rotate(a1, (find(a1, " "))), "-"))-2)
2	Yumbo Licorice - Black	=mid(a2, (find(a2, " ")+1), (find(rotate(a2, (find(a2, " "))), "-"))-2)
3	Yumbo Gum - Cherry	=mid(a3, (find(a3, " ")+1), (find(rotate(a3, (find(a3, " "))), "-"))-2)
4	Yumbo Gum - Grape	=mid(a4, (find(a4, " ")+1), (find(rotate(a4, (find(a4, " "))), "-"))-2)

The following spreadsheet provides the results of the formulas.

	A	B
1	Yumbo Licorice - Cherry	=Licorice
2	Yumbo Licorice - Black	=Licorice
3	Yumbo Gum - Cherry	=Gum
4	Yumbo Gum - Grape	=Gum

Repeat — Duplicating a String Pattern
Use the **repeat** function to duplicate a string pattern a specified number of times. For example, you can use **repeat** to create separators between column headings and data.

Syntax
repeat(string , number of times)

where:

string — Is a character string or a single-cell reference that contains a character string.

number of times Specifies the number of times that you want to repeat the string pattern.

Remarks

To have the resulting string separated with spaces, you must include a space at the end of the **string** argument. For example, the formula repeat('NEW',3) returns NEWNEWNEW with no spaces. To include a space in the result, the formula would be repeat('NEW ', 3), which returns NEW NEW NEW.

Examples

repeat(' ', 5)

repeat('---', 1)

repeat(c9, 3)

repeat({Spreadsheet A}a1, 5)

The following spreadsheet uses asterisks to separate the column headings from data. Instead of typing 15 asterisks in the cell beneath each heading, you would enter the formula repeat(' ',5) under each heading.

	A	B	C
1	Territory	Dollar Sales	Unit Sales
2	=repeat("***", 5)	=repeat("***", 5)	=repeat("***", 5)
3	Chicago	$ 29,450	2,945
4	Dallas	23,450	2,345
5	Fresno	20,980	2,098

The following spreadsheet provides the results of the formulas.

	A	B	C
1	Territory	Dollar Sales	Unit Sales
2	=***************	=***************	=***************
3	Chicago	$ 29,450	2,945
4	Dallas	23,450	2,345
5	Fresno	20,980	2,098

When you print the spreadsheet, the equal sign does not appear in the output.

Right — Extracting Characters from the Right End of a String

Use the **right** function to extract a character sequence from the right end of a character string. For example, you can use **right** when you have cells that contain a city, state, and zip code, and you want to use only the zip code in another column.

Syntax

right(string , number of characters to return)

where:

string	Is a character string or a single-cell reference that contains a character string.
number of characters to return	Specifies the number of characters to return from the right end of the string.

Examples

right('Degan's House O'Marbles',7)

right(a2,9)

right({Spreadsheet A}a2,5)

right('Missoula, MT 5 9 1',5)

For example, the following spreadsheet lists several product names for spices produced by the Addromatic Spice Company. For one of your applications, you require only the spice names. You would use the **right** function with the **find** and **len** functions to return only the spice name, which follows the hyphen in the full product name.

	A	B
1	Addromatic Spices - Basil	=right(a1, (len(a1)-(find(a1, "-")+1)))
2	Addromatic Spices - Cinnamon	=right(a2, (len(a2)-(find(a2, "-")+1)))
3	Addromatic Spices - Oregano	=right(a3, (len(a3)-(find(a3, "-")+1)))
4	Addromatic Spices - Pepper	=right(a4, (len(a4)-(find(a4, "-")+1)))

The following spreadsheet shows the results of the formulas.

	A	B
1	Addromatic Spices - Basil	=Basil
2	Addromatic Spices - Cinnamon	=Cinnamon
3	Addromatic Spices - Oregano	=Oregano
4	Addromatic Spices - Pepper	=Pepper

Rotate — Shifting the Position of Characters Within a String

Use the **rotate** function to shift characters from the right or left end of a character string to the other end of the string.

Syntax

rotate(string , number of characters to shift)

where:

string	Is a character string or a single-cell reference that contains a character string.
number of characters to shift	Specifies the number of characters to move. A positive number moves the characters from the left end of the string to the right; a negative number moves the characters from the right end of the string to the left.

Examples

rotate('Verafin Scuba Gear',8)

rotate(g7,f5)

rotate(d4,-9)

rotate({Spreadsheet A}h8,4)

Suppose you have the following spreadsheet listing products from MasterPiece Auto Parts which is changing its company name to PieceMaster. You need to change the company name for the parts listed in column A. You would use the **rotate** function with the **left** and **find** functions to change the company name, and the **concat** function to incorporate the rotated characters into the part names.

	A	B
1	MasterPiece Air Filter	=concat((rotate(left(a1, find(a1, " ")-1), find(a1, "Pi")-1)), edit(a1, " ", 1, 12)
2	MasterPiece Oil Filter	=concat((rotate(left(a2, find(a2, " ")-1), find(a2, "Pi")-1)), edit(a2, " ", 1, 12)
3	MasterPiece Floor Mats	=concat((rotate(left(a3, find(a3, " ")-1), find(a3, "Pi")-1)), edit(a3, " ", 1, 12)
4	MasterPiece Car Wax	=concat((rotate(left(a4, find(a4, " ")-1), find(a4, "Pi")-1)), edit(a4, " ", 1, 12)

The following spreadsheet presents the results of the formulas.

	A	B
1	MasterPiece Air Filter	=PieceMaster Air Filter
2	MasterPiece Oil Filter	=PieceMaster Oil Filter
3	MasterPiece Floor Mats	=PieceMaster Floor Mats
4	MasterPiece Car Wax	=PieceMaster Car Wax

String — Converting a Number to a String

Use the **string** function to change a positive value to a character string.

Syntax

string(number to convert to a string {, number of decimal places })

where:

number to convert	Is any literal number or a single-cell that contains a number.
number of decimal places	Specifies the optional number of decimal places that you want to display in the result. The default number of places is seven.

Examples

string(35.876,)

string(c7, 4)

string(a1, b1)

string(567.98345)

The following spreadsheet has area codes and phone numbers entered as numbers in columns A and B, respectively. You would use the **string** function to convert the numbers to text, and the **left**, **right**, and **concat** functions to insert the hyphens.

	A	B	C
1			Phone No.
2	408.00	4,378,222.00	=concat(string(a2, 0), "-", left(string(b2, 0), 3), "-", right(string(b2, 0), 4))
3	415.00	9,613,600.00	=concat(string(a3, 0), "-", left(string(b3, 0), 3), "-", right(string(b3, 0), 4))

The following spreadsheet shows the results of the formulas.

	A	B	C
1			Phone No.
2	408.00	4,378,222.00	=408-437-8222
3	415.00	9,613,600.00	=415-961-3600

Val — Converting a Number Entered as Text to a Value

Use the **val** function to convert numbers entered as text to values.

Syntax

val(string)

where:

string Is a character string or a single-cell reference that contains a character string.

Remarks

If the **string** argument contains non-numeric characters before a number, a zero is returned. If the **string** argument contains non-numeric characters following a number, the number is returned and the characters are ignored. For example, val('Jan 1994') returns 0.00. The formula val('1994 jan') returns 1,994.00.

Examples

val('1994')

val(f5)

val({Spreadsheet A}a1)

The following spreadsheet contains the formula for the current date and time in cell a1. You can use the formulas in column B to maintain a continuous update of the day's fractional time. You would use the **datestr** function to extract the component of the current time necessary to calculate the hours, minutes, and seconds as numbers. You would use the **val** function to convert the extracted time sequence into a value, and then use the **timenum** function to calculate the current fraction of a day.

	A	B
1	=now(second)	
2	Hours	=val(datestr(A1, hour, day))
3	Minutes	=val(datestr(A1, minute, hour))
4	Seconds	=val(datestr(A1, second, minute))
5	Fraction of Day	=timenum(B2, B3, B4)

The following spreadsheet shows the results of the formulas.

	A	B
1	=August 3, 1994 16:17:36	
2	Hours	=16.00
3	Minutes	=17.00
4	Seconds	=36.00
5	Fraction of Day	=0.68

Table Functions

Table functions are located in the **Tables** menu. These functions include commands that facilitate your use of the spreadsheet tables. You can use table functions to retrieve:

An entry from a list by specifying a position in the list

A value from a range in a table by specifying a column and a row position in the range

Table 8 lists each function and provides an example of its usage and a brief description. Detailed information about each table function follows.

Table 8. Table functions

Function	Syntax and Examples	Description
choose	choose(position number , list) choose(3,5,6,7,8) choose(f5/f2,5,6,7,8) choose(1,'Ellen','Sue','John')	Returns the value in a specified position number from a list of items, counting the first value as zero.
hlookup	hlookup(key value , range , row offset) hlookup(5,c30:e50,1) hlookup('Discount',b10:f40,3)	Searches a range of cells horizontally, and returns a value by comparing the specified value to the values in the top row of the specified range.
index	index(range , column offset, row offset) index(b4:c12,0,5) index([Region A],1,4) index(a4:b11,a2,d4)	Returns the value in the specified column and row positions from a range in a table, counting the left column and top row as zero.
vlookup	vlookup(key value , range , column offset) vlookup(7,p65:q75,1)	Searches a range of cells vertically, and returns a value by comparing the specified value to the values in the first column of the specified range.

Choose — Retrieving a Value from a List

Use the **choose** function to retrieve an entry from a list of values.

Syntax

choose (position number, list)

where:

number	Is the position of the value you want to retrieve from the list of items.
list	Is a group of numeric or string values.

Remarks

The first value in the list has a position number of zero.

The **position number** argument can be a number, a cell reference, a formula, or a function with a numeric value, and cannot be greater than the number of values in

the list. If the **position number** is not a whole number, the decimal portion is truncated.

A list can contain both numeric and string values.

Examples

choose(,12,3,7,8)

choose(2,12,3,7,8)

choose(1,d1,d2,d3,d4)

Suppose you want to calculate the shipping cost from different warehouse locations. Shipping costs are a one-time charge for each warehouse. Warehouse 1 has a $10.00 shipping charge, warehouse 2 has a $5.00 charge, warehouse 3 has a $15.00 charge, warehouse 4 has a $3.00 charge, and warehouse 5 has a $20.00 charge. You would use the **choose** function to set up a calculation that returns the shipping charge associated with each warehouse.

	A	B	C	D	E	F
1	Warehouse	Product No.	Quantity	Unit Price	Shipping	Total Cost
2	2	4120-03	4	$ 50.00	=choose(a2,0,10,5,15,3,20)	=E2+C2*D2
3	5	1110-09	2	$ 120.00	=choose(a3,0,10,5,15,3,20)	=E3+C3*D3
4	1	3000-70	15	$ 3.00	=choose(a4,0,10,5,15,3,20)	=E4+C4*D4
5	4	4120-03	5	$ 50.00	=choose(a5,0,10,5,15,3,20)	=E5+C5*D5
6	3	1120-15	12	$ 25.00	=choose(a6,0,10,5,15,3,20)	=E6+C6*D6
7	4	2650-01	7	$ 100.00	=choose(a7,0,10,5,15,3,20)	=E7+C7*D7

In cell E2, the position number is the value in cell A2 (2). The value of the item in the list with a position number of 2 is 5 (or $5.00), because the first value in the list has a position number of zero.

The total cost is calculated by multiplying the unit price by the quantity, and adding the shipping charge. The following spreadsheet shows the results of the calculations.

	A	B	C	D	E	F
1	Warehouse	Product No.	Quantity	Unit Price	Shipping	Total Cost
2	2	4120-03	4	$ 50.00	$ 5.00	=$ 205.00
3	5	1110-09	2	$ 120.00	$ 20.00	=$ 260.00
4	1	3000-70	15	$ 3.00	$ 10.00	=$ 55.00
5	4	4120-03	5	$ 50.00	$ 3.00	=$ 253.00
6	3	1120-15	12	$ 25.00	$ 15.00	=$ 315.00
7	4	2650-01	7	$ 100.00	$ 3.00	=$ 703.00

Hlookup — Searching Horizontally for a Value in a Range of Cells

Use the **hlookup** function to search a table horizontally for a value.

Syntax

hlookup(key value , range , row offset)

where:

key value	Is a number, a string, a cell reference, or a formula or function with a numeric value.
range	Is a cell range or region name.
row offset	Is the number of the row in the table from which you want to retrieve a value.

Remarks

The top row in the range (the key row) contains key values and the subsequent rows contain return values.

The top row in the table has an offset of zero; the next row has an offset of one, and so on.

If the values in the range's key row are numeric, they must be arranged in ascending order.

If the key value is numeric, the largest value in the table not greater than the key value is returned. If the key value is a string, an exact match must be found.

The key value argument must be the same data type as the value you are searching for in the range, or an error is returned. For example, if the key value is the date June 1994, the range must contain the *date* June 1994. If the range contains the *string* June 1994, an error is returned.

Examples

hlookup(25,a15:f3 ,3)

hlookup('Yellow',d25:h5 ,12)

Suppose you have the following spreadsheet that contains customer payment information. You want to calculate the discount each customer receives when making a purchase. The discount is based on the amount of the purchase and whether the customer uses cash or a credit card as payment. Payment type 1 corresponds to cash and payment type 2 corresponds to credit. You would use the **hlookup** function to calculate the discount.

	A	B	C	D	E
1	CUSTOMER NO.	PAYMENT TYPE	AMOUNT	DISCOUNT	TOTAL
2	423-78	1	$ 125.00	= hlookup(c2,b!6:e!8,b2)*c2	=C2-D2
3	275-21	2	$ 375.00	= hlookup(c3,b!6:e!8,b3)*c3	=C3-D3
4	759-76	1	$ 205.00	= hlookup(c4,b!6:e!8,b4)*c4	=C4-D4
5					
6	SALES TYPE	$ 100.00	$ 200.00	$ 300.00	$ 400.00
7	1 = CASH	5.00 %	6.00 %	7.00 %	8.00 %
8	2 = CREDIT	3.00 %	4.00 %	5.00 %	6.00 %

key row →

The **hlookup** function calculates the discount using the following method:

The **hlookup** function compares the values in the range specified in the formula (B!6:E!8). In cell D2, the key value is the amount of purchase or the value in cell C2 ($125.00).

The **hlookup** function compares the key value ($125.00) to the values in the key row (row 6) of the range, searching for the largest value not greater than the key value. In this example, it is $100.00 in column B.

The row offset is calculated by the payment type (cash or credit). In this example, the payment type is 1, as obtained from the calculation in cell B2. Therefore, the row offset is 1, and the return value is one row down (from row 6) in column B of the range (5.00%).

The discount the customer receives is 5.00% multiplied by the purchase amount ($125.00) or $6.25. The total amount the customer pays is the purchase amount minus the discount, as shown in the following spreadsheet.

	A	B	C	D	E
1	CUSTOMER NO.	PAYMENT TYPE	AMOUNT	DISCOUNT	TOTAL
2	423-78	1	$ 125.00	= $ 6.25	=$ 118.75
3	275-21	2	$ 375.00	= $ 18.75	=$ 356.25
4	759-76	1	$ 205.00	= $ 12.30	=$ 192.70
5					
6	SALES TYPE	$ 100.00	$ 200.00	$ 300.00	$ 400.00
7	1 = CASH	5.00 %	6.00 %	7.00 %	8.00 %
8	2 = CREDIT	3.00 %	4.00 %	5.00 %	6.00 %

Index — Retrieving a Value from a Specified Location

Use the **index** function to retrieve a value from a range in a table by specifying a column and a row offset.

Syntax

index(range , column offset,row offset)

where:

range	Is a cell range or region name.
column offset	Is the number of the column in the table from which you want to retrieve a value.
row offset	Is the number of the row in the table from which you want to retrieve a value.

Remarks

The first column in the table has an offset of zero; the next column has an offset of one, and so on.

The top row in the table has an offset of zero; the next row has an offset of one, and so on.

The column offset and row offset you specify must be within the table's range.

For both the column offset and the row offset, if the number you specify is not a whole number, the decimal portion is truncated.

Examples

index(d3:g8,1,2)

index(a1:e5,3,2)

Suppose you want to calculate the commission (the percentage of sales) each account executive receives. You would use the **index** function to calculate the commission based on total sales and territory. In the following spreadsheet, the location of the table is the cell range b7:e9. The column offset is based on total sales, and the row offset is based on territory.

	A	B	C	D	E
1		ACCOUNT EXECUTIVE	TOTAL SALES	TERRITORY	COMMISSION
2		Douglass	$ 30,000	2	= index(b!7:e!9,(c2/10000)-1,d2-1)*c2
3		Jamison	$ 40,000	1	= index(b!7:e!9,(c3/10000)-1,d3-1)*c3
4		Smith	$ 20,000	3	= index(b!7:e!9,(c4/10000)-1,d4-1)*c4
5					
6	REGION	<$20,000	<$30,000	<$40,000	<$50,000
7	1	5.00 %	6.00 %	8.00 %	12.00 %
8	2	6.00 %	7.50 %	10.00 %	15.00 %
9	3	7.00 %	9.50 %	15.00 %	18.00 %

The following spreadsheet shows the results of the formulas.

	A	B	C	D	E
1		ACCOUNT EXECUTIVE	TOTAL SALES	TERRITORY	COMMISSION
2		Douglass	$ 30,000	2	= $ 3,000.00
3		Jamison	$ 40,000	1	= $ 4,800.00
4		Smith	$ 20,000	3	= $ 1,900.00
5					
6	REGION	<$20,000	<$30,000	<$40,000	<$50,000
7	1	5.00 %	6.00 %	8.00 %	12.00 %
8	2	6.00 %	7.50 %	10.00 %	15.00 %
9	3	7.00 %	9.50 %	15.00 %	18.00 %

Vlookup — Searching Vertically for a Value in a Range of Cells

Use the **vlookup** function to search a table vertically for a value.

Syntax

vlookup(key value , range , column offset)

where:

key value	Is a number, a string, a cell reference, or a formula or function with a numeric value.
range	Is a cell range or region name.
column offset	Is the number of the column in the table from which you want to retrieve a value.

Remarks

The first column in the range (the key column) contains key values and the subsequent columns contain return values.

The first column in the table has an offset of zero; the next column has an offset of one, and so on.

If the values in the range's key column are numeric, they must be arranged in ascending order.

If the key value is numeric, the largest value in the table not greater than the key value is returned. If the key value is a string, an exact match must be found.

The key value argument must be the same data type as the value you are searching for in the range, or an error is returned. For example, if the key value is the date June 1994, the range must contain the *date* June 1994. If the range contains the *string* June 1994, an error is returned.

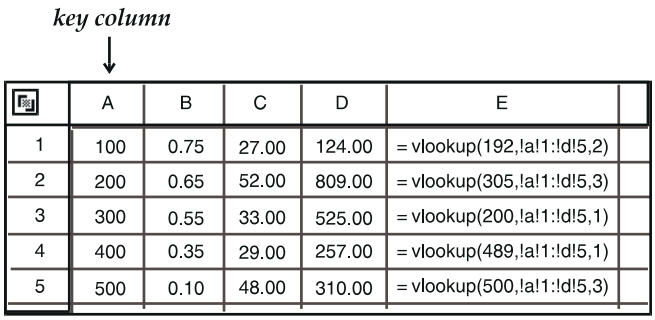
Examples

vlookup(75,d2 :h4 ,3)

vlookup('Shampoo',a1 :c25,1)

Suppose you want to use the **vlookup** function to calculate values in a numeric table. The location of the table in the spreadsheet is the cell range a1:d5. The key column is always the first column in the range.

key column



	A	B	C	D	E
1	100	0.75	27.00	124.00	= vlookup(192,!a!1:!d!5,2)
2	200	0.65	52.00	809.00	= vlookup(305,!a!1:!d!5,3)
3	300	0.55	33.00	525.00	= vlookup(200,!a!1:!d!5,1)
4	400	0.35	29.00	257.00	= vlookup(489,!a!1:!d!5,1)
5	500	0.10	48.00	310.00	= vlookup(500,!a!1:!d!5,3)

The **vlookup** function calculates using the following method:

In cell e1, the formula specifies the key value as 192 and the column offset as 2.

The **vlookup** function compares the key value (192) to the values in the key column of the range (column A), searching for the largest value not greater than the key value. In this example, it is the value 100 in row 1.

The **vlookup** function counts the column offset (2) to retrieve the return value of 27.00.

The following spreadsheet shows the results of the formulas.

	A	B	C	D	E
1	100	0.75	27.00	124.00	= 27.00
2	200	0.65	52.00	809.00	= 525.00
3	300	0.55	33.00	525.00	= 0.65
4	400	0.35	29.00	257.00	= 0.35
5	500	0.10	48.00	310.00	= 310.00

Miscellaneous and Logical Functions

The **Operators** menu contains miscellaneous functions and the logical functions **if** and **set@**. Table 9 lists the functions in the **Operators** menu and provides syntax examples and brief descriptions. Detailed information about the **if** and **set@** functions follows.

Table 9. Miscellaneous functions

Function	Example	Description
error	if(b3=error, 0, 1) if(c4=d4, error, 10)	Can be used with the **if** function as one of the values in the conditional statement or as a result of the function, which returns an error value.
false	if(8>10,true, false)	In an **if** statement, returns the value **False**.
if	if((c1<b1),(e1+e2),(f1+f2))	Constructs conditional formulas that resolve to one of two values, determined by whether the results of the argument are true or false.
na	if(b3=b7, na, 10) if(a6=na, 0, 1)	Can be used with the **if** function as one of the values in the conditional statement or as a result of the function, which returns an N/A value.
set@	set@b=18	Sets the specified @-variable in a capsule application's control window to the value entered, or to the value of the specified cell, formula, range, or region.
true	if(8<10,true,false)	In an **if** statement, returns the value **True**.

If — Evaluating Conditional Statements

Use the **if** function to construct conditional formulas. Conditional formulas resolve to one of two values determined by whether the results of the argument are true or false. You can use conditional formulas to evaluate text strings and dates.

For example, the formula if(b5>=1 , .1, .2) returns 0.1 if the value in b5 is greater than or equal to 10,000; it returns 0.2 if the value in the cell is less than 10,000.

You can also use the **if** function with the **run, skip,** and **clear** keywords to perform conditional processing in a Capsule application. See the *Capsule User's Guide* for more information.

Syntax

if(condition , result1 , result2)

where:

condition	Is a value-operator-value argument. The value is a single-cell reference, a literal number, or a formula. The operator is one of the logical operator or relational operator symbols (and, or, not, =, not=, <, >, < =, or > =).
result1 and result2	Are single-cell references, literal numbers, literal strings; or true, false, na, or error values.

Remarks

The **condition** argument can include more than one comparison, as illustrated in some of the examples below.

Examples

if(g4=g3,f4 g4,na)

if(((n2+m2)=(p2+q2))and((r2+s2)=(t2+v2)),true,false)

if(count(G3)>H!3, if(count(G3)>H!4, if(count(G3)>H!5, 1,), H!5), H!3)

if(c2,a1,b1)

if(a1='Chicago',2 ,)

if(d3=date(@G),true,false)

if(date(a1)=date (b1),a1,b1)

if(d7= ,na,d7)

if(h1 <1 ,error,h1)

Set@ — Setting an @-Value in a Capsule Application

Use **set@** to enter a value or list of values for a specific @-variable in the Capsule tool control window. You can use the **set@** function when the spreadsheet performs iterations inside a Capsule application and you want certain values to change for each iteration.

Syntax

set@ variable = expression

where:

variable	Is the variable that you want to set in the Capsule tool control window. The letter can be uppercase or lowercase.
expression	Is any formula using functions, mathematical and relational operators, or expressions; or literal numbers, ranges, or regions.

Remarks

If the Capsule application contains several nested Capsule applications, the @-values are set only for the Capsule application in which the spreadsheet resides.

Examples

```
set@b=18

set@ad=sum(F6:F18)

set@CZ=D7

set@C=A3:C7
```

In the following spreadsheet, the formula in cell b4 calculates the dollar sales for two years. The formula in cell c4 sets **@C** in the Capsule tool control window to equal the value in cell b4.

	A	B	C	
1		DOLLAR SALES		
2	1994	15,700,000		
3	1995	23,900,000		
4	TOTAL	= 39,600,000	= set@C = b4	

Appendix B. Keyboard Alternatives

Key combinations provide certain shortcuts when you format a spreadsheet. For example, by pressing Ctrl+i, you can italicize selected data. You can also set other character attributes.

This appendix lists all of the available key combinations in the Spreadsheet tool.

The key combinations in Table 10 allow you to set character formats for selected data.

The key combinations marked with an asterisk (*) toggle the format. For example, pressing Ctrl+u when the selection is already underlined removes the underline.

Table 10. Key combinations for setting character formats

Press Ctrl + this character	To produce this result
b	Bold*
i	Italic*
u	Underline*
d	Double underline*
o	Overstrike *
1	Helvetica, 8-point
2	Helvetica, 10-point
3	Helvetica, 12-point
4	Times-Roman, 8-point
5	Times-Roman, 10-point
6	Times-Roman, 12-point
7	Courier, 10-point

The key combinations in Table 11 allow you to align information in a cell.

Table 11. Key combinations for aligning data

Press Ctrl + this character	To produce this result
l	Flush left
c	Center
r	Flush right
g	General

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Glossary

Abbreviated. In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Type** field that displays the month and year in a shortened version.

abs. In the Spreadsheet Options window, the function in the **Math** menu that returns the value of a positive or negative number as a positive number.

absolute cell reference. Cell coordinates that remain the same when the cell containing the coordinates is copied or replicated. Absolute cell references are preceded with an exclamation point.

Accept. (1) In the Spreadsheet Options window, the choice in the **Incoming Formats** field that transfers all of the formats from an icon into the spreadsheet. (2) In the Spreadsheet Options window, the choice in the **Incoming Formats** field that transfers all of the formats from an icon into the region.

aggregate functions. A function that combines values. The aggregate functions are: average, concat, fract, max, median, min, mod, mode, round, std dev, sum, and variance.

Alignment. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the position of information in a cell.

All. In the Spreadsheet Options window, the choice in the **Print** field that prints the entire spreadsheet.

and. In the Spreadsheet Options window, the function in the **Expressions** menu that as the conditional argument, returns **True** if both arguments in the statement are true; returns **False** if either argument in the statement is false.

Ascending. The choice in the **Sort Level** fields of the Sort Control window that arranges the data in order from smallest to largest or from A to Z.

Attributes. In the Font Attributes panel of the Spreadsheet Options window, the field in which the user specifies text formats.

Automatically. In the Spreadsheet Options window, the choice in the **Recalculate** field that recalculates formulas when a change is made in the spreadsheet.

average. In the Spreadsheet Options window, the choice in the **Statistics** menu that adds a list of values together, divides the result by the number of items in the list, and returns that value.

Bold. In the Font Attributes panel of the Spreadsheet Options window, the toggle button in the **Attributes** field that makes the selected text darker.

button. An object, in a window or window header, that contains graphics or text and is used to open other windows, open a menu, perform an action, or set a condition.

Calculate. In the Spreadsheet Options window, the field in which the user specifies whether a spreadsheet performs calculations once or repeatedly until a specific condition is met.

Calculation. In the Spreadsheet Options window, the button that expands the window and displays the options for calculations.

Cardinal. In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Number** field that displays numbers indicating a quantity: 3, 10, or 31.

case. In the Spreadsheet Options window, the function in the **Strings** menu that returns a string capitalized according to the specified type. Enter U for all uppercase, L for all lowercase, I for initial capitalization, and C to change uppercase characters to lowercase or lowercase characters to uppercase.

Cell. The choice in the Spreadsheet Options window that displays the options for formatting cell data.

cell. An area at the intersection of a column and a row that may contain a value.

cell coordinate. A column letter and row number within the spreadsheet that identify an intersection point of a specific cell.

Cell Format. In the Spreadsheet Options window, the toggle button that expands the window and displays the options for formatting cells.

cell protection. A process that prevents the contents of a cell from being cleared or changed.

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cell reference. Cell coordinates used in formulas.

cell type. The classification of the contents of a cell. A cell can be one of four types:formula, text, number, or date.

Centered. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Alignment** field that formats the data in a cell with the same amount of space on either side.

choose. In the Spreadsheet Options window, the function in the **Tables** menu that returns a value in a specified position number from a list of items, counting the first value as zero.

cirr. In the Spreadsheet Options window, the function in the **Finance** menu that returns the continuous internal rate of return of a time-series range of cells.

clean. In the Spreadsheet Options window, the function in the Strings menu that removes spaces or tabs at the specified end of a string. Enter R for right, L for left, and B for both ends of the string.

Clear Data. The window header button that removes all unprotected data from the spreadsheet, but leaves cell formats intact.

column. A vertical field within a spreadsheet. Columns are identified by letters at the top of the display area.

Column. (1) The field in the Sort Control window in which the user specifies the column by which the data is sorted. (2) The choice in the Spreadsheet Options window that displays the options for formatting columns. (3) In the Spreadsheet Options window, the choice in the **Calculation Order** field that sets a spreadsheet to calculate formulas by descending through each column.

Columns. In the Spreadsheet Options window, the field in which the user specifies the columns of the spreadsheet printed as titles.

concat. In the Spreadsheet Options window, the function in the **Strings** menu that connects the items in a list.

Coordinates. (1) The field in the Sort Control window in which the user specifies the cell coordinates to sort. (2) In the Spreadsheet Options window, the field in which the user specifies the cell coordinates of the region. (3) In the Spreadsheet Options window, the field that appears when the **Range** choice is selected in the **Print** field, in which the user specifies the cell coordinates to print.

Copy/Move Control. A window in which the user can specify whether to copy or move the formulas, formats, and values, or combinations of the three, from one spreadsheet to another.

count. In the Spreadsheet Options window, the function in the **Statistics** menu that returns the number of the specified cells that contain numeric values. This function ignores any cells that contain N/A or error values.

Ctrl key combinations. A combination of keys pressed to change text appearance or manipulate content of an icon.

date. In the Spreadsheet Options window, the function in the **Date and Time** menu that converts a string to a date.

Date. In the Spreadsheet Options window, the choice in the **Type** field that formats the cell for a date entry, and displays the field for entering dates.

Date and Time. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used with date and time periods.

datebuild. In the Spreadsheet Options window, the function in the **Date and Time** menu that returns a date composed from the numbers specified in the argument.

datenum. In the Spreadsheet Options window, the function in the **Date and Time** menu that evaluates a small date period within an optional larger period.

Date Number. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies the type of number used in a date: cardinal or ordinal.

Date Order. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies the arrangement of the month, day, and year in a cell.

Date Separator. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies the separator used between the month, day, and year.

datespan. In the Spreadsheet Options window, the function in the **Date and Time** menu that counts the number of periods in the date.

datestr. In the Spreadsheet Options window, the function in the **Date and Time** menu that extracts the string piece of a date based on the specified periods.

Date/Time Format. In the Spreadsheet Options window, the toggle button that expands the window and displays the options for formatting dates and time entries.

Date/Time Order. In the **Date and Time Format** panel of the Spreadsheet Options window, the field in which the user specifies the arrangement of the date and time in a cell.

Date Type. In the **Date and Time Format** panel of the Spreadsheet Options window, the field in which the user specifies how the date will be displayed in a cell.

decimal precision. The number of displayed decimal places in a number.

Decimal Precision. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the number of decimal places to appear in a number.

Decimal Separator. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the character used as a decimal separator.

Descending. The choice in the **Sort Level** fields of the Sort Control window that arranges the data in order from largest to smallest or from Z to A.

Description. (1) In the Spreadsheet Options window, the field in which the user enters optional information about the region. (2) In the Spreadsheet Options window, the read-only field that appears when **Formula** is selected in the **Type** field, that displays information about the selected function.

Digit Placeholder. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the character used to elongate a number to a specific length.

Display. The field in the Spreadsheet Options window in which the user specifies which page of options to show in the window.

display area. The area below the Spreadsheet window header where columns and rows appear.

Displayed. In the Spreadsheet Options window, the choice in the **Number Precision** field that calculates formulas using the value of the numbers displayed in a spreadsheet.

displayed precision. The number of digits that are displayed in a cell.

Display Symbol. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the symbol to be displayed with a number.

dividend. A quantity to be divided.

divisor. The quantity by which another quantity, the dividend, is divided.

Double Underline. In the **Font Attributes** panel of the Spreadsheet Options window, the toggle button in the **Attributes** field that places two lines under the selected text.

edit. In the Spreadsheet Options window, the function in the **Strings** menu that inserts a new string into an old string at the first character position.

Entry. (1) The choice in the Spreadsheet Options window that displays the field for entering data into the spreadsheet. (2) In the Spreadsheet Options window, the field in which the user enters data into cells.

error. In the Spreadsheet Options window, the function in the **Expressions** menu that returns **True** if a specified cell contains the word **Error**, otherwise returns the value **False**.

Error. (1) In the Spreadsheet Options window, the toggle button in the **Ignore In Aggregate Functions** field that controls whether error values are used in aggregate functions. (2) In the Spreadsheet Options window, the toggle button in the **Show** field that controls whether error values are displayed in the spreadsheet.

exact. In the Spreadsheet Options window, the function in the **Strings** menu that returns **True** if the specified two strings match; otherwise, returns the value **False**.

Example. In the Spreadsheet Options window, the read-only field that appears when **Formula** is selected in the **Type** field, that displays an example using the selected function.

exp. In the Spreadsheet Options window, the function in the **Math** menu that returns the result of **e** raised to a specified power.

Expressions. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used with conditional arguments.

external reference. In a spreadsheet, a reference to a cell or region in another spreadsheet to use data from the other spreadsheet.

false. In the Spreadsheet Options window, the function in the **Expressions** menu that returns the value **False** if the argument is false.

Finance. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used in financial calculations.

find. In the Spreadsheet Options window, the function in the **Strings** menu that searches a string for another string and returns the character position of the found string.

Fixed. In the Spreadsheet Options window, the choice in the **Height** field that allows the user to specify a constant height for the rows.

Flush Left. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Alignment** field that formats the data to the left side of a cell.

Flush Right. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Alignment** field that formats the data to the right side of a cell.

Focus on Selection. The choice in the Special menu that moves a selected column, row, or cell to the upper-left corner of the Spreadsheet window.

Font. In the Font Attributes panel of the Spreadsheet Options window, the field in which the user selects the font for text in a cell.

Font Attributes. In the Spreadsheet Options window, the toggle button that expands the window and displays the options for formatting text in cells.

Formats. (1) The toggle button in the **Use Only** field of the Copy/Move Control window that controls whether spreadsheet formats are copied or moved along with other information being copied or moved. (2) In the Spreadsheet Options window, the toggle button in the **Transfer In Capsule** field that controls whether spreadsheet formats are transferred when a spreadsheet is used in a capsule application.

Formula. In the Spreadsheet Options window, the choice in the **Type** field that formats the cell for a formula entry, and displays the field for entering formulas and the buttons for each category of functions.

Formulas. (1) The toggle button in the **Use Only** field of the Copy/Move Control window that controls whether formulas are copied or moved along with other information being copied or moved. (2) In the Spreadsheet Options window, the toggle button in the **Transfer In Capsule** field that controls whether formulas are transferred when a spreadsheet is used in a capsule application. (3) In the Cell Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Show** field that displays the formula in a cell rather than the result of the calculation.

fract. In the Spreadsheet Options window, the function in the **Math** menu that returns the decimal part of a number.

Freeze Selection. The choice in the **Special** menu that causes specified columns and row to remain stationary while the user scrolls the rest of the spreadsheet.

freezing. The process of keeping columns and rows visible during the scrolling process.

Full. In the Spreadsheet Options window, the choice in the **Number Precision** field that calculates formulas using the value of the numbers entered in a spreadsheet.

full precision. The full value of a number, or the entire value that was entered into the spreadsheet.

function. A mathematical expression describing a relationship between two or more variables.

fv. In the Spreadsheet Options window, the function in the **Finance** menu that returns the future value of an annuity at a given rate for a specified number of periods.

grid. The vertical and horizontal lines in the display area that compose the columns, rows, and cells of the spreadsheet.

Grid. (1) In the Spreadsheet Options window, the toggle button in the **Show** field that controls whether a grid is displayed in the spreadsheet. (2) In the Spreadsheet Options window, the toggle button in the

Print With field that controls whether a grid appears in the printed spreadsheet.

Height. In the Spreadsheet Options window, the field in which the height of the selected rows is specified.

hlookup. In the Spreadsheet Options window, the function in the **Tables** menu that returns a value from a horizontal table of keys and values by comparing the specified value to the values in the key row.

Hour Format. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies a 12-hour or 24-hour clock to be used with time entries.

if. In the Spreadsheet Options window, the function in the **Expressions** menu that is used to construct conditional formulas that resolve to one of two values, determined by whether the results of the argument(s) are true or false.

Ignore. (1) In the Spreadsheet Options window, the choice in the **Incoming Formats** field that does not transfer any of the formats from an icon into the spreadsheet. (2) In the Spreadsheet Options window, the choice in the **Incoming Formats** field that does not transfer any of the formats from an icon into the region.

Ignore In Aggregate Functions. In the Spreadsheet Options window, the field in which the user specifies the values to ignore in aggregate functions.

Incoming Formats. (1) In the Spreadsheet Options window, the field in which the user specifies whether the spreadsheet will accept or reject formats from another tool. (2) In the Spreadsheet Options window, the field in which the user specifies whether the region will accept or reject formats from another tool.

index. In the Spreadsheet Options window, the function in the **Tables** menu that returns the value from a range in a table when column and row offsets in the range are specified.

int. In the Spreadsheet Options window, the function in the **Math** menu that returns the value of a specified number as an integer.

irr. In the Spreadsheet Options window, the function in the **Finance** menu that returns the internal rate of return for a series of cash flows.

Italic. In the Font Attributes panel of the Spreadsheet Options window, the toggle button in the **Attributes** field that makes the selected text slanted.

Label. In the Spreadsheet Options window, the field in which the user names the region.

left. In the Spreadsheet Options window, the function in the **Strings** menu that returns the specified number of characters from the left end of the string.

len. In the Spreadsheet Options window, the function in the **Strings** menu that returns the number of characters in the string.

Length. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the length of an entry.

ln. In the Spreadsheet Options window, the function in the **Math** menu that returns the natural logarithm, base e of a number.

log. In the Spreadsheet Options window, the function in the **Math** menu that returns the base 10 logarithm of a number.

Long. In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Type** field that displays the day of the week, month, day, and year.

Manually. In the Spreadsheet Options window, the choice in the **Recalculate** field that allows the user to specify when to recalculate formulas by clicking on the **Recalculate** button.

Math. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used in mathematical formulas.

max. In the Spreadsheet Options window, the function in the **Math** menu that returns the maximum value found in a specified list.

Maximum Recalculations. In the Spreadsheet Options window, the field in which the user specifies the number of times the spreadsheet should recalculate if it does not reach a specified value.

median. In the Spreadsheet Options window, the function in the **Statistics** menu that sorts the list of items and returns the value of the middle item in the list.

mid. In the Spreadsheet Options window, the function in the **Strings** menu that extracts a substring from a specified start position in a string and returns the specified number of characters.

min. In the Spreadsheet Options window, the function in the **Math** menu that returns the minimum value found in a specified list.

mod. In the Spreadsheet Options window, the function in the **Math** menu that divides the dividend by the divisor and returns the remainder.

mode. In the Spreadsheet Options window, the function in the **Statistics** menu that returns the most frequent value in a list of items.

N/A. (1) In the Spreadsheet Options window, the toggle button in the **Ignore In Aggregate Functions** field that controls whether N/A values are used in aggregate functions. (2) In the Spreadsheet Options window, the toggle button in the **Show** field that controls whether N/A values are displayed in the spreadsheet.

N/A. A Formula cell type that indicates that information for that cell is not available.

na. In the Spreadsheet Options window, the function in the **Expressions** menu that returns **True** if a specified cell contains **N/A**, otherwise returns **False**.

Name Region. The choice in the **Special** menu that displays the Region page of the Spreadsheet Options window.

Negative Representation. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the format for a negative number.

not. In the Spreadsheet Options window, the function in the **Expressions** menu that as the conditional argument, returns **True** if the argument is false; and returns **False** if the argument is true.

not=. In the Spreadsheet Options window, the function in the **Expressions** menu that as the conditional argument, returns **True** if the arguments are not equal; otherwise returns **False**.

now. In the Spreadsheet Options window, the function in the **Date and Time** menu that returns the current date or the date in the specified period when the formulas are recalculated.

npv. In the Spreadsheet Options window, the function in the **Finance** menu that returns the net present value of a stream of payments, specified by a range of cells, at a given rate.

Number. In the Spreadsheet Options window, the choice in the **Type** field that formats the cell for a numeric entry, and displays the field for entering numbers.

Number Format. In the Spreadsheet Options window, the toggle button that expands the window and displays the options for formatting numbers.

Number Precision. In the Spreadsheet Options window, the field in which the user specifies the number precision that is used in calculations.

Numeric. In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Type** field that displays the date as numbers.

Numeric Display. In the Number Format panel of the **Cell** page of the Spreadsheet Options window, the field in which the user specifies the format for displaying numbers.

Once. In the Spreadsheet Options window, the choice in the **Calculate** field that specifies that a spreadsheet performs calculations only once after a value is changed.

or. In the Spreadsheet Options window, the function in the **Expressions** menu that as the conditional argument, returns **True** if either argument in the statement is true; and returns **False** if both arguments in the statement are false.

Order. In the Spreadsheet Options window, the field in which the user specifies whether the spreadsheet calculates by column or row.

Ordinal. In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Number** field that displays numbers indicating an order: 3rd, 10th, or 31st.

Overstrike. In the Font Attributes panel of the Spreadsheet Options window, the toggle button in the **Attributes** field that places a line through the selected text.

panel. An expanded area of the Spreadsheet Options window that displays additional options for the spreadsheet.

period. In the Spreadsheet Options window, the function in the **Date and Time** menu that returns a period as a string from the specified date. Valid periods are: second, minute, hour, day, week, qweek, month, bimonth, ebimonth, quarter, and year.

Placement. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the position of a symbol in positive and negative values.

Print. In the Spreadsheet Options window, the field in which the user specifies the amount of the spreadsheet to be printed.

Print With. In the Spreadsheet Options window, the field in which the user specifies the characteristics that appear when the spreadsheet is printed.

Protection. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies whether or not to prevent a cell from being overwritten.

pv. In the Spreadsheet Options window, the function in the **Finance** menu that returns the present value of a specified payment at a given rate, either specified cells or values, for a specified number of periods.

random. In the Spreadsheet Options window, the function in the **Statistics** menu that returns a random number between 0 and 1.

range. A group of cells to which a common name has been assigned.

Range. In the Spreadsheet Options window, the choice in the **Print** field that prints a specified area of spreadsheet cells.

Recalculate. (1) A window header button that recalculates values after data has been changed. (2) In the Spreadsheet Options window, the field in which the user specifies recalculations to occur automatically or manually.

region. A specified range of cells to which a unique name has been assigned into which data can be transferred from other icons.

Region. The choice in the Spreadsheet Options window that displays the options for formatting a region.

relative cell reference. Cell coordinates that change when the cell containing the reference is copied or replicated.

repeat. In the Spreadsheet Options window, the function in the **Strings** menu that returns the specified string pattern repeated a specified number of times.

replicate. To duplicate a formula from one cell to another cell or to a range of cells using the **Replicate From** button in the window header.

Replicate From. The window header button that duplicates a formula or value from one cell to another cell or to a range of cells. To use the **Replicate From** button, the user first selects the destination cells, then clicks on the **Replicate From** button, and finally, selects the cell with the formula to be duplicated.

result. A cell that contains the outcome of a calculation.

Results. In the Cell Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Show** field that displays the outcome of a formula.

right. In the Spreadsheet Options window, the function in the **Strings** menu that returns the specified number of characters from the right end of the string.

rotate. In the Spreadsheet Options window, the function in the **Strings** menu that shifts a string a specified positive or negative number of characters. A positive number shifts characters from the left end of the string to the right; a negative number shifts characters from the right end of the string to the left.

round. In the Spreadsheet Options window, the function in the **Math** menu that rounds a number to the specified number of places.

Rounding. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the format used for numbers when they are displayed with a specific decimal precision.

Row. (1) The choice in the Spreadsheet Options window that displays the options for formatting rows. (2) In the Spreadsheet Options window, the choice in the **Calculation Order** field that sets a spreadsheet to calculate formulas by moving across each row.

row. A horizontal field in a spreadsheet, identified by a row number.

Rows. In the Spreadsheet Options window, the field in which the user specifies the rows of the spreadsheet printed as titles.

rule. A cell that contains the formula for a calculation.

Run BASIC Program. The choice in the **Special** menu that begins running a called BASIC program located on the same level as the Spreadsheet icon.

scroll. To move the image in a window up, down, left, or right to view information that is not currently visible in the window.

Self-Adjusting. In the Spreadsheet Options window, the choice in the **Height** field that changes the height of the rows according to the specified font size.

set@. In the Spreadsheet Options window, the function in the **Expressions** menu that sets the value of the specified @-variable in a capsule application's User Input Control window to the value entered or to the value of the specified cell or formula.

Show. (1) In the Spreadsheet Options window, the field in which the user specifies the values and characteristics to display in a spreadsheet. (2) In the Cell Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the form in which the values in a cell are displayed.

Show Copy/Move Controls. The window header button that opens the Copy/Move Control window.

Show Sort Controls. The window header button that opens the Sort Control window.

Size. In the Font Attributes panel of the Spreadsheet Options window, the field in which the user selects the type size of the font.

Sort Control. The window in which the user can specify how the data will be sorted.

Sort Level. One of five fields in the Sort Control window in which the user specifies the sort order for information in the spreadsheet.

Spreadsheet. (1) The window in which the user can enter and manipulate data for a spreadsheet. (2) The choice in the Spreadsheet Options window that displays the options for formatting the entire spreadsheet.

Spreadsheet. An Intelligent Decision Server tool used to perform complex data analysis and to perform iteration in embedded capsules.

Spreadsheet Options. The window that enables the user to view and modify the properties of the Spreadsheet tool.

Standard. (1) In the Number Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Rounding** field that displays a number rounded to the specified decimal precision. (2) In the Date and Time Format panel of the Spreadsheet Options window, the choice in the **Date Type** field that displays month, day, and year.

Statistics. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used in statistical calculations.

std dev. In the Spreadsheet Options window, the function in the **Statistics** menu that returns the standard deviation of the values of a list of items.

string. In the Spreadsheet Options window, the function in the **Strings** menu that converts a number to a text string with the specified number of decimal places.

string. A sequence of text characters.

Strings. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used with text strings.

sum. In the Spreadsheet Options window, the function in the **Statistics** menu that adds the values of a list of items.

Swiss Monetary. In the Number Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Rounding** field that rounds the numbers after a decimal point to the next monetary value.

Symbol. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the character to be used with a number.

Syntax. In the Spreadsheet Options window, the read-only field that appears when **Formula** is selected in the **Type** field, that displays the syntax for the selected function.

Tables. In the Spreadsheet Options window, the button that appears when **Formula** is selected in the **Type** field, which opens a menu containing functions used with spreadsheet tables.

Text. In the Spreadsheet Options window, the choice in the **Type** field that formats the cell for a text entry, and displays the field for entering text.

Thousands Separator. In the Number Format panel of the Cell page of the Spreadsheet Options window, the field in which the user specifies the format used for a number in the thousands.

timenum. In the Spreadsheet Options window, the function in the **Date and Time** menu that converts a time specified in hours, minutes, and seconds into a fractional value of a day. For example, timenum(23,7,30) reurns .96.

Time Separator. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies the separator used in time entries.

timestr. In the Spreadsheet Options window, the function in the **Date and Time** menu that converts time from a fraction of a day to a string.

Titles. In the Spreadsheet Options window, the toggle button in the **Print With** field that controls whether titles appear with the printed spreadsheet.

To Specified Value. In the Spreadsheet Options window, the choice in the **Calculate** field that specifies that a spreadsheet performs calculations to a value set by the user after a value is changed.

Transfer In Capsule. In the Spreadsheet Options window, the field in which the user specifies the characteristics of the spreadsheet to be transferred when the spreadsheet is used in a capsule application.

true. In the Spreadsheet Options window, the function in the **Expressions** menu that returns the value **True** if the argument is true.

Truncate. In the Number Format panel of the Cell page of the Spreadsheet Options window, the choice in the **Rounding** field that displays a number cut off at the specified decimal precision.

Type. In the Spreadsheet Options window, the field in which the user specifies the format of the data in a cell.

Underline. In the Font Attributes panel of the Spreadsheet Options window, the toggle button in the **Attributes** field that places a line under the selected text.

Unfreeze Selection. The choice in the **Special** menu that restores mobility to stationary columns and rows, so that they move when the user scrolls the window.

unfreezing. A process that reverses the freezing of cells so that they move when the user scrolls through a spreadsheet.

Units. In the Spreadsheet Options window, the field in which the user specifies the type of measurement used to size a column or row.

Unname Region. The choice in the **Special** menu that removes the unique name from a specified group of cells.

Use Only. The field in the Copy/Move Control window in which the user specifies the characteristics of the cells to be copied or moved.

val. In the Spreadsheet Options window, the function in the **Strings** menu that converts a text string to a number. If the string cannot be converted to a number, the number zero is returned.

value. A quantity assigned to a constant, a variable, parameter, or a symbol.

Value. In the Spreadsheet Options window, the field in which the user specifies a value to which the spreadsheet recalculates until all of the values within the spreadsheet change by no more than the amount of the value entered in the field.

Values. (1) The toggle button in the **Use Only** field of the Copy/Move Control window that controls whether values in a spreadsheet are copied or moved along with other information being copied or moved. (2) In the Spreadsheet Options window, the toggle button in the **Transfer In Capsule** field that controls whether values in a spreadsheet are transferred when a spreadsheet is used in a capsule application.

variance. In the Spreadsheet Options window, the function in the **Statistics** menu that returns the variance of the values of a list of items.

vlookup. In the Spreadsheet Options window, the function in the **Tables** menu that returns a value from a vertical table of keys and values by comparing the specified value to the values in the key column.

Width. In the Spreadsheet Options window, the field in which the user specifies the width of the selected columns.

Year Format. In the Date and Time Format panel of the Spreadsheet Options window, the field in which the user specifies the format of a year in a date entry.

Zero. In the Spreadsheet Options window, the toggle button in the **Show** field that controls whether zero values are displayed in the spreadsheet.

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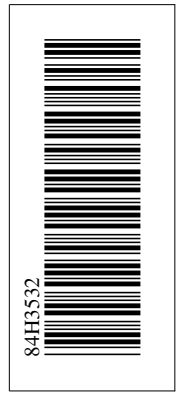

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