# Workbooks and Worksheets

* An Excel file is a workbook
* Each workbook consists of one or more worksheets
* A worksheet is a matrix of rows and columns
* Columns are labeled with letters A through XFD, after Column Z comes AA
* Rows are labeled with numbers 1 - 1048576
* A cell can contain any type of data
* The Intersection of a row and column is a cell
* At any given time, one cell is active
* Each cell has an address specified by the column and row
* Formulas refer to cells by the cell address

# Malleable Matrix

* Capable of being shaped

# Important Features

* Automatic replication
* Automatic recalculation
* Predefined functions

# Cell Addressing

* Relative Cell Address: Relative to the current location. When replicated, it is automatically changed relative to the new position. E.g. A5
* Absolute Cell Address: Not relative to any location. When replicated, it remains the same. $A$5. To specify an address to be absolute, a $ is placed in front of the component that is to be absolute.
* Horizontal replication: column changes. Move left, column decreases. Move right, column increases.
* Vertical replication: row changes. Move up, row decreases. Move down, row increases.
* Suppose the formula

=$A$1\*C3 is in cell C4

Replicate left into B4: =$a$1\*B3

Replicate right into D4: = $a$1\*D3

Replicate up into C3: = $a$1\*C2

Replicate down into C5: = $a$1\*C4

Note $A$1 does not change. It is aboslute

# Column titles containing more than one line

* Type data after typing data for each line then press alt+enter
* The last line, simply press enter

# Entering Dates

* Dates are considered to be numeric data and are right aligned
* Excel automatically formats the data so it resembles the way you entered it
* September 15, 1998 is displayed as 15-September-98

# Formulas

* If calculations were entered directly as their result, they would have to be recalculated each time the data changed
* Enter formulas, excel will always recalculate for you
* Suppose D3 is the active cell
* B3 contains a principle value and B2 contains a rate
* In D3, enter =b3\*b2 to obtain the product of B3 and B2
* The preceding = tells Excel that you are entering a formula or a function
* Numeric operators: \*(multiplication), +(addition), -(subtraction or negation), /(division), %percentage, ^ (exponentiation)

# SS2Ex

# Notice the formula for Year

# =sum(b3:e3)

# sum is a built-in function. A function takes optional parameters in parenthesis and returns a value. The formula:

# =b3+c3+d3+e3

# would have provided the same results. Let Excel do the work for you!!!!

# Order of operations

* Excel follows same order as used in algebra
* From left to right: negation, percentages, exponentiations, multiplications, divisions, additions, subtractions
* Parenthesis overrides order

|  |  |
| --- | --- |
| **Formula** | **Result** |
| =g6 | Assigns value in cell g6 to the active cell |
| =4+-5^2 | Assigns the sum of 4+25 to the active cell |
| =3\*j4 | Assigns three times the contents of cell j4 to he active cell |
| =25%\*12 | Assigns the product of 0.25 times 12 to the active cell |
| =5\*(l14-h3) | Assigns the product of five times the difference between the values contained in cells h3 and l14 to the active cell |

# Point mode to enter formulas

* With cell h3 selected type an equals sign to begin the formula
* Click cell d3 (excel surrounds cell d3 with a marquee and appends d3 to the equals sign in cell h3)
* Type an \*
* click cell g3 (excel surrounds cell g3 with a marquee and appends g3 to the asterisk in cell h3)
* Click enter box or press enter key to complete the operation

# Copy formulas using fill handle

* Click on cell containing the formula
* Point to the fill handle (lower right corner of the cell)
* Drag the fill handle through the cells in which formula is to be copied
* Release left mouse button
* Can also copy a range of formulas by selecting the range and using the fill handle as described above

# Average, Max, and Min functions

* =average(d3:d7) computes the average of cells d3, d4, d5, d6, and d7
* You can type in =average(
* Then click first cell in the range and drag through the endpoint of the range
* Then press enter of click on enter box
* To determine the highest number in a range, the function name is Max
* To determine the lowest number in a range, the function name is Min

# Formatting

* Data within a worksheet can be formatted to improve its appearance
* To change the font, click on a cell, click the font box arrow and point and click the desired font. Click font size box arrow and point and click desired size
* You can increase the size of a character or contiguous characters by double clicking on the cell to edit cell contents.
* Drag through the desired character(s)
* Point to font size box arrow and point and click desired size
* Change fill color for a cell by selecting it, click fill color button arrow on formatting toolbar, point to desired color and click
* Change the character color by clicking on the font color button arrow on the formatting toolbar, point to he appropriate color and click

# Centering Data in a range of cells

* Select a range of cells
* Click the center button on the formatting tool bar
* Note: nonadjacent ranges can be selected by: Select range, then hold down ctrl key and select nonadjacent range

# Formatting

* Currency style button
* Comma style button
* Percent style button
* Increase and decrease trailing zero's in the decimal places

# Changing Widths of columns and heights of rows

* Default column width of 8.43 characters
* Character defined as a letter, symbol, number, punctuation mark in 10-point TT Arial font
* Default row height is 12.75 points (point = 1/72 of an inch)
* Change width of column by dragging: point to boundary on right side of column above row (mouse pointer becomes a split double arrow) and drag to left to decrease width - dotted line shows proposed right border of column - and release mouse button.
* Drag right to increase width
* Heights of rows can be adjusted similarly

# Spell Check

* Click
* Tools and select spell check

# Displaying Formulas for printing

* Select Tools
* Options
* Window options: check formulas box
* Displays the formulas instead of the result of the calculation

# Fitting wide worksheet on single sheet

* Click Page Setup on File menu
* In page setup dialog box, click page tab
* Click Landscape option
* Click fit to option button
* Wide worksheet prints on one page in landscape orientation
* Point and click print button
* Click OK in the print dialog box

# Change print scaling option back to 100%

* Click page setup on the file menu
* Click page tab in the page setup dialog box
* Click the Adjust to option in the Scaling area
* If necessary, type 100 in the Adjust to box
* Click OK button

# Assumptions

* *Assumptions* are cells whose values you can change to determine new values for formulas

# Rotating Text

* Text entered normally in a cell has a 0 degree angle and reads from left to right
* Text can be rotated counterclockwise by entering a number between 1 and 90 degrees on the alignment sheet in the Format Cells dialog box
* Suppose column headings are in b3, c3, d3, e3 and they are to be January, February, March, and April respectively
* Go to b3 and type in January
* Rotate the text in b3 45 degrees as described above
* Use a fill handle to create a series
* Point to the fill handle in the lower right edge of cell be (mouse pointer changes to a cross hair)
* Drag the fill handle to the right to select the range c3:e3
* Release the mouse button
* Excel uses January in cell b3 as the basis and fills in the months in the range

# Copy a Cell's format using Format Painter

* As described above, b3:e3 are column headings, each with a month and appear at a 45 degree angle
* They are a series
* To copy the format without becoming part of the series, for example, to add a column containing a total, go to the cell and type in heading
* Select a cell containing the desired format
* On the standard toolbar, click on the format painter button
* Move the mouse pointer to the cell you want to have the selected format and click

# Copying nonadjacent Cells

* Select the range to be copied
* Click the copy button on the standard toolbar or select Edit from the main menu and select copy
* Copy copies the contents to the clipboard, replacing anything that may be in the clipboard
* Click on the cell that is the top cell in the past area
* Press the enter key to complete the copy
* Instead of pressing enter, you can click on Edit from the main menu and click on paste

# Drag and Drop

* To copy or move, select an area, point to the border of the cell range (mouse pointer changes to a block arrow)
* To copy, hold ctrl while dragging selection to its new location. Be sure to release mouse button before releasing the ctrl key
* To move, drag the selected area to its new location
* Cut and paste can also be used from Edit selection of the main menu to move data

# Insert Rows and columns

* On insert menu, click rows to insert a row
* On insert menu, click columns to insert a column
* Cells can also be inserted from the insert menu

# Freezing Worksheet Titles

* Useful technique for viewing large worksheets hat extend beyond he window
* Click on the cell below the column headings you want to freeze and to the right of the row titles you want to freeze
* Click Window on the menu bar and point and click freeze panes
* Unfreeze panes command on the Window menu allows you to unfreeze them

# System Date and Time

* Click on cell where information is to be placed
* Click the Paste Function button on the Standard Toolbar
* Click Date & Time in the function category list box and then click NOW in the function name list box
* Point and click OK

# Absolute Versus Relative Addressing

* Suppose you are entering data as shown below
* You enter the first column then sum it
* After entering second and third column, you would copy the sum formulas and excel will adjust the references
* This is called relative addressing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | C1 | C2 | C3 | Totals |
| R1 | 123 |  |  |  |
| R2 | 456 |  |  |  |
| R3 | 789 |  |  |  |
| Totals | =SUM(B2:B4) |  |  |  |

* Following is the sheet after formula from b5 is copied to c5 and d5 and e2 is copied to e3 and e4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | C1 | C2 | C3 | Totals |
| R1 | 123 | 999 | 876 | =SUM(B2:D2) |
| R2 | 456 | 453 | 300 | =SUM(B3:D3) |
| R3 | 789 | 66 | 333 | =SUM(B4:D4) |
| Totals | =SUM(B2:B4) | =SUM(C2:C4) | =SUM(D2:D4) |  |

* Suppose an assumption were used and placed in A8
* That value is to be multiplied by each sum in row 5

Following is the worksheet with only column b calculated

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | C1 | C2 | C3 | Totals |
| R1 | 123 | 999 | 876 | =SUM(B2:D2) |
| R2 | 456 | 453 | 300 | =SUM(B3:D3) |
| R3 | 789 | 66 | 333 | =SUM(B4:D4) |
| Totals | =SUM(B2:B4)\*A8 |  |  |  |
|  |  |  |  |  |
| Assumption |  |  |  |  |
| 0.54 |  |  |  |  |

* Suppose the same technique of copying the data from b5 to c5 an d5 is used
* Notice what happens
* Each sum is suppose to be multiplied by the constant .54

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | C1 | C2 | C3 | Totals |
| R1 | 123 | 999 | 876 | =SUM(B2:D2) |
| R2 | 456 | 453 | 300 | =SUM(B3:D3) |
| R3 | 789 | 66 | 333 | =SUM(B4:D4) |
| Totals | =SUM(B2:B4)\*A8 | =SUM(C2:C4)\*B8 | =SUM(D2:D4)\*C8 |  |
|  |  |  |  |  |
| Assumption |  |  |  |  |
| 0.54 |  |  |  |  |

* Excel makes the adjustment where
* The addresses are relative
* Instead, the reference to A8 should be an absolute reference
* Excel would copy the absolute reference as shown below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | C1 | C2 | C3 | Totals |
| R1 | 123 | 999 | 876 | =SUM(B2:D2) |
| R2 | 456 | 453 | 300 | =SUM(B3:D3) |
| R3 | 789 | 66 | 333 | =SUM(B4:D4) |
| Totals | =SUM(B2:B4)\*$A$8 | =SUM(C2:C4)\*$A$8 | =SUM(D2:D4)\*$A$8 |  |
|  |  |  |  |  |
| Assumption |  |  |  |  |
| 0.54 |  |  |  |  |

* Notice the difference
* All equations reference A8
* Absolute referencing keeps a cell reference constant when it copies a formula or function
* Mixed Cell reference, Cell reference with only one dollar sign before either the column or the row
* Note table below:

|  |  |
| --- | --- |
| **Cell Reference** | **Meaning** |
| **$B$16** | Both column and row references remain the same when you copy this cell reference because they are absolute |
| B$16 | This cell reference is mixed. The column reference changes when you copy this cell reference to another column because it is relative. The row reference does not change because it is absolute |
| $B16 | This cell reference is mixed. The row reference changes when you copy this cell reference to another row because it is relative. The column reference does not change because it is absolute |
| B16 | Both column and row references are relative. When copied to another row and column, both the row and column in the cell reference are adjusted to reflect the new location |

# Loan Example

* Following is an example of how to calculate the amortization of a loan



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Loan Calculator | |  |  |  |  |
|  |  |  |  |  |  |

# Showing Formulas:



# Making Decisions

* **IF** function
* Inspect data and fill in manually
* Error prone
* Let Excel do it for you
* If a sales person generates at least a certain sales figure (assumption stored in b19), that person receives a bonus that is stored as an assumption in b18. Total sales for each month is stored in row 4 (first in b4)

*=IF(B4>=$B$19,$B$18,0)*

* General form:

*=IF(logical\_test,value\_if\_true,value\_if\_false)*

* To view the arguments to an IF:
* Type formula into cell
* with cell active, click edit formula box in formula bar to display the IF formula palette
* Click OK

# Goal Seeking

* You know the result you want a formula to produce
* Use *Goal Seek* to determine the value of a cell on which he formula depends
* Select the cell that has the formula in which you want a desired result (e.g. net sales)
* Click Tools on the menu bar and point and click Goal Seek
* Click the To value text box and type in the desired result
* Click the by changing cell text box and either type in the cell reference or click on the cell reference
* Click OK
* When the Goal seek status dialog box displays, click OK
* The value of the formula changes to the desired value and the dependent on cell changes
* Suppose you have the following Spreadsheet

|  |  |  |
| --- | --- | --- |
| Assumptions | |  |
|  |  | |
| Advertising | 29.15% | |
| Commissions | 3% | |
| Bonuses | $50,000.00 | |
| Tech Support | $111,579.69 | |
| Manufacturing | $800,000.00 | |
|  |  | |
| Net Sales | $3,542,126.00 | |
| Expenses |  | |
| Commissions | $106,263.78 | |
| Advertising | $1,032,529.73 | |
| Tech Support | $111,579.69 | |
| Manufacturing | $800,000.00 | |
| Total Expenses | $2,050,373.20 | |
|  |  | |
| Net | $1,491,752.80 | |

* You want Net income to change to $1,500,000.00 and you want to know how much you have to reduce the advertising percentage to accomplish this.

|  |  |  |
| --- | --- | --- |
| Assumptions | |  |
|  |  | |
| Advertising | 28.92% | |
| Commissions | 3% | |
| Bonuses | $50,000.00 | |
| Tech Support | $111,579.69 | |
| Manufacturing | $800,000.00 | |
|  |  | |
| Net Sales | $3,542,126.00 | |
| Expenses |  | |
| Commissions | $106,263.78 | |
| Advertising | $1,024,282.53 | |
| Tech Support | $111,579.69 | |
| Manufacturing | $800,000.00 | |
| Total Expenses | $2,042,126.00 | |
|  |  | |
| Net | $1,500,000.00 | |