INTRODUCTION TO MICROSOFT EXCEL: DATA ENTRY AND FORMULAS

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SECTION ONE: WHAT IS MICROSOFT EXCEL

MICROSOFT EXCEL is a SPREADSHEET program used for organizing and managing data. This data can be anything, but EXCEL is most useful when managing quantitative, or numerical, data such as for accounting, statistics, or record keeping.

What makes Excel powerful is its ability to calculate data or perform functions when certain specified conditions are met. Excel can change the color of text to indicate when you have gone over budget, it can perform different calculations with provided data based on the day of the week, and it can perform heavy arithmetic as you provide variables in real time.

A SPREADSHEET is a sheet full of rows and columns that make up a great many boxes called CELLS. COLUMNS are labeled along the top of the SPREADSHEET A to Z and then AA to ZZ and so on. ROWS are labeled along the left side of the SPREADSHEET numerically. These Labels are not part of your end product and will not be seen if you were to print, they only exist to designate CELLS.

FOR EXAMPLE

The top left CELL is A-1, five spaces below is A-6 and five spaces to the right of A-6 is F-6.

In EXCEL the SPREADSHEET stretches out almost indefinitely; you’ll never run out of CELLS.

SECTION TWO: DATA ENTRY

To enter data, simply click on a CELL and begin typing. You can put anything in the cell, numbers, letters, or punctuation. When you click on a cell you effectively highlight it, so if you want to edit a CELL and not completely retype it, you’ll need to take an extra step and click on the text in the FORMULA BAR.

The FORMULA BAR is just above the SPREADSHEET, it is a long text box that has “fx” to the left of it. When you select a CELL the data you input is fed through the FORMULA BAR, so if you wanted to edit a CELL with data already in it, if you click the CELL you’ll find that data in the FORMULA BAR and can edit it just like it was a typical text box, like the address bar in Internet Explorer.
The FORMULA BAR is set up this way because it has the unique capability of executing equations, for instance you can use the FORMULA BAR to have CELL F-1 display the sum of CELLS A-1 through A-10. This is something we’ll cover a little later.

SECTION THREE: FORMATTING

If you look at the top of the EXCEL screen you’ll find a toolbox similar to what you would see in Microsoft Word. Just like in Microsoft Word your toolbox is broken into several tabs.

Just like Microsoft Word, HOME is where you’ll find the most frequently used tools. CLIPBOARD and FONT are just as they appeared in Microsoft Word. Within FONT you will find two buttons in the lower right corner with a bar of color underneath. These are used to add color to your SPREADSHEET. Use the button with the paint can icon, FILL COLOR, to color the background of a CELL. Use the icon with the fancy A, FONT COLOR, to color the text of a CELL.

To select multiple CELLS, click on a CELL and drag your mouse until the desired set are highlighted. You can also click a CELL once and tap the arrow keys while holding shift for the same result. To select all CELLS, click the box in the upper left corner of the SPREADSHEET between A and 1 in your columns and rows. It will look like a triangle pointing to the bottom right corner.

As you enter data you may notice your text exceed the boundaries of its CELL. In order to adjust the CELL in order to accommodate the data you may wish to stretch or shrink a row or column. To stretch/shrink a COLUMN or ROW hover your mouse over the label (ex. A, B, C, 1, 2, 3) where a faint blue line separates the adjacent label. Your mouse should change from an arrow or a plus sign into a bold cross with two arrows pointing in opposite directions. Drag and Drop the line in order to adjust the size.

Another method to accommodate data is to use the WRAP TEXT button, which is located in the alignment section of the Home tab. This will adjust the dimensions of a CELL row or column automatically.

ALIGNMENT will affect the characters in the cells, not the cells themselves. Everything is as it was in the PARAGRAPH field of Microsoft Word, but you’ll notice new icons on the far left of the ALIGNMENT field. The top button is WRAP TEXT.

Sometimes a CELL will not present values the way you intend. For instance, it may add or delete decimal places on you. It is good to know about FORMAT CELLS... in order to be able to fix problems like these directly. If you right click a CELL you should see an option labeled FORMAT CELLS... this option allows you to see the format settings of a specific CELL. Many
tabs in this menu should be familiar to you as they are in the HOME tab, but NUMBER is new. NUMBER controls how the CELL simplifies values within it, be it by including or eliminating decimals or by rounding up.

Printing is just as it was in Microsoft Word with one crucial exemption: Microsoft Word deals with finite pages of 8.5x11 inches, but SPREADSHEETS go on forever. When you print in EXCEL the program breaks the SPREADSHEET into sections and prints pages based off of this, therefore, you may not have all the same information on the page you desire. Always click PRINT PREVIEW to show how a page will print. Once a PRINT PREVIEW is generated, EXCEL will indicate the size of a page with a black broken line on the SPREADSHEET, allowing you to adjust COLUMN and ROW sizes to accommodate.

SECTION FOUR: SORTING

On the right side of the HOME tab you’ll find EDIT. EDIT contains two essential functions, the first being SORT. SORT allows you to rearrange the values in a COLUMN to organize your ROWS. You cannot SORT values by ROWS to organize your columns. Excel will assume the first row is a label, so for best results reserve the first row for that function.

FOR EXAMPLE
Say you were recording the prices of your book collection in Excel. COLUMN A would contain the title, B would contain the author, and C would contain the price. You can use SORT to arrange the collection alphabetically by author or title or from most expensive to least. Values will stay together in the same row, so everything will be sorted together.

To SORT first highlight the column you wish to sort. For best results only use one column. Click on SORT and select either A->Z (Smallest to Largest) or Z->A (Largest to Smallest). Sometimes you will get a prompt asking if you wish to expand the selection to include nearby values. This is asking you if you missed a value in the column you highlighted, if you did miss something select “expand the selection” if you did not miss anything select “continue.”

You can also SORT by selecting a region (including your label row) and using the same buttons, this will assume you want to sort by the first column. You can also select a region and click CUSTOM SORT in the sort menu for more control over your sorting. This will allow you to sort by multiple columns as well by clicking “Add Level” within the CUSTOM SORT menu.
SECTION FIVE: SIMPLE FORMULAS

Formulas are where the real power of Excel can be found and you’ll get your first taste of it with the SUM button, which is also on the home tab. SUM is the top left button in EDIT and allows you to calculate values based on your CELLS. To calculate in EXCEL simply select a cell for the resulting value to be placed and then click the drop down menu in SUM and select what you wish to find. Then highlight the relevant CELLS, i.e. the ones with values (not labels) in the following prompt (the outline should be a blue broken line). You do not need to select only one COLUMN or ROW. CELLS do not need to be adjacent either, to select a remote group of values hold CTRL to add a CELL to the highlighted group. When you are finished hit the enter key.

FOR EXAMPLE
Picking up with our book collection, we can use EXCEL to calculate the total value of our collection. All we need to do is click a CELL (like right beneath all of the prices we entered) and then click on the SUM icon and select SUM. We then highlight the values in COLUMN C (prices) and hit enter. We can use the same method to find the average price of a book in our collection or the range of prices.

If you perform a SUM and click on the CELL in question and view the formula bar you will see something like “=SUM(A2:A10)”. This is a formula that expresses instructions telling Excel to add values in a range.

When information is entered into the formula bar it appears in a cell verbatim. However when information is entered beginning with “=” the cell will interpret it as a formula.

Example
[A1] [F(x) 2+2] will produce [2+2] in cell A1
[A1] [F(x)=2+2] will produce [4] in cell A1

When a formula bar begins with “=” a formula is assumed. In some cases a formula can be understood with simple characters (like f(x)=2+2) but often you will need to enter a code to be understood. These formula codes can be found in the FORMULA TAB and cover a wide array of functions. For instance, the proper way to input the formula “2+2” is as follows:

F(x)=Sum(2,2)

All formulas in Excel take this basic form. “Sum” instructs excel to use a specific formula, in this case simple addition. “()” is used to specify what values will be used in the formula, in this case 2 and 2. “,” is used to separate different values, and in this formula we can have as many values as we want so we can make ”F(x)=Sum(2,2,2,2,2)” and get 10 as a result.
Typing in $F(x) = \text{Sum}(2,2)$ to enter a value of 4 is fairly useless. Excel’s real strength comes from building formulas out of variables in order to make a spreadsheet flexible and adaptable. Some formulas such as the logic function “$F(x) = \text{TODAY}()$” can serve as variables, but for the most part you will be using the cells in your spreadsheet as variables. If you enter $F(x) = \text{[Cell Name]}$ you will get the value in that cell. So if A2 has a value of 2 $F(x) = \text{A2}$ will yield “2”. If you change A2 to have a value of 200 the cell with $F(x) = \text{A2}$ will in turn have a value of 200.

You can create a range of variables for a formula by using the character “:”. $F(x) = \text{Sum}(\text{A1:A5})$ will find the sum of cell A1+A2+A3+A4+A5.

**SECTION SIX: COMBINING FORMULAS**

Often you will find yourself in a position where you will need to use two mathematical functions in order to solve a problem, for instance, the sum of one set of numbers multiplied by a set of another set of numbers. This is possible in Excel if you pay mind to the language. Remember that “,” separates values.

Example

$F(x) = \frac{3(\text{A1+A2+A3+A4+A5})}{\text{(B1+B2+B3+B4+B5)}}$

To solve this math problem (assuming you knew all the cell values) you would work from the inside out. First add all the cell values together, then multiply the sum of A1-A5 by 3, then divide by B1-B5. Expressed in Excel you would use the same order

$F(x) = \text{Product}(3,\text{Sum(A1:A5)})/\text{Sum(B1:B5)}$

**SECTION SEVEN: LOGIC FUNCTIONS**

Logic is a term that refers to using Quantitative (mathematical) principles to answer Qualitative (abstract) questions using a binary solution. A binary system is one involving only two objects, and in the case of programming this is a “True” (yes, 1) or a “False” (no, 0).

Binary comes into play the most when paired with If....then statements. For instance “If the Sun is up then I have to wake up.” Using logic functions like If() effectively allows you to program using Excel!

The If() formula looks like this:

$F(x) = \text{If(FORMULA,"STATEMENT_TRUE","STATEMENT_FALSE")}$

Where “STATEMENT_TRUE/FALSE” contains whatever you want displayed when the formula is true or false.
Here is a question we can answer in Excel with logic:

“Is today Wednesday?”

With Logic our answer is “It is X that it is Wednesday.” We need to replicate that in Excel and our first task is to acknowledge the date.

\[ F(x) = \text{Weekday}(\text{Today}()) \]

This Excel formula will produce data to indicate the day of the week of today’s date, providing the statements “Today is Sunday” “Today is Monday” and so on expressed as a number, 1 being Sunday, 2 being Monday and so on. That means “It is True that it is Wednesday.” is only true when \( F(x) = \text{Weekday}(\text{Today}()) \) produces a 4, or in other words

**If** \( F(x) = \text{Weekday}(\text{Today}()) \) **produces a 4 then** it is Wednesday.

\[ F(x) = \text{if}(4 = \text{Weekday}(\text{Today}()), \text{True}, \text{False}) \]

If this is entered into Excel it will state False on every day except for Wednesday, effectively answering the question.

Justifiably I’ve been asked what is the point of such an obtuse formula, well, this deep into Excel we have begun programming, and an important part of programming is having the imagination to find a solution to a dense problem. Logic is just another tool in your arsenal. Let’s explore a practical example.

Say you run a business and you are tracking your orders from a vendor. You log the list price of your purchases in column B and ranges from row 2 to row 10. Something you have to factor in is shipping and handling, which is a flat rate of $4 per item.

The first part of your formula is the total list price, which is a simple sum

\[ = \text{Sum}(B2:B10) \]

Next is the shipping, which is $4 multiplied by the amount of items you bought. You can use a variable towards this end called COUNT which will count each cell with data in it in a specified range. You’ll want to multiply 4 by COUNT by using the PRODUCT formula.

\[ = \text{Product}(\text{Count}(B2:B10), 4) \]

Combining the formulas, you’ll simply want to add the total list by the shipping.
=Sum(Sum(B2:B10),PRODUCT(COUNT(B2:B10),4))

Ok, now say your vendor has a special deal where they do not charge shipping for orders placed on Fridays. You want to factor in the savings, but you don’t want to write an extra spreadsheet for Fridays. This is where logic can come in handy.

As demonstrated earlier, we can have Excel acknowledge if the day is Friday with the following formula:

=If(Weekday(Today())=6, TRUE, FALSE)

TRUE is the solution to the formula if the function is true, FALSE is submitted if the function is false. Therefore we can supplement our shipping to produce a $0 on Friday and $4 every other day.

=If(Weekday(Today())=6,0,4)

So if we combine that with our previous formula we can seamlessly factor this sale into our previously established spreadsheet.

=Sum(Sum(B2:B10),PRODUCT(COUNT(B2:B10),IF(Weekday(Today())=6,0,4)))

So if we bought 8 items for a total of $50 on a Friday the following arithmetic will be performed

50 + ( 8 x 0 ) = 50 + 0 = 50

And if the same is done on a Monday

50 + ( 8 x 4 ) = 50 + 32 = 82