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| $=$ | Equal: are two things equal? |
| :---: | :--- |
| $<>$ | Not: are two things not equal? Type less than symbol, then greater than symbol. |
| $>$ | Greater than: is the thing on the left greater than the thing on the right? |
| $>=$ | Greater than or equal to: is thing on the left greater than or equal to thing on the right? |
| $<$ | Less than: is the thing on the left less than the thing on the right? |
| $<=$ | Less than or equal to: is the thing on the left less than or equal to the thing on the right? |

## Logical Tests

1) A Logical Test is a test that evaluates to TRUE or FALSE.
2) Logical Tests have only two possible answers: TRUE or FALSE.
3) Examples of Logical Tests:

- Single Logical Tests:

1. $12=12$, this evaluates to TRUE
2. "Dog"="Dog", this evaluates to TRUE
3. $500>=500$, this evaluates to TRUE
4. $11=12$, this evaluates to FALSE
5. "Cat"="Dog", this evaluates to FALSE
6. 499.99>=500, this evaluates to FALSE

- Array Formula Logical Tests:

1. A16:A22=E16, this evaluates to \{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\}
2. (A16:A22=E16)+(B16:B22=F16) $\rightarrow$ \{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\}+\{TRUE;FALSE;FALSE;TRUE;FALSE;FALSE;FAL $S E\} \rightarrow\{2 ; 1 ; 0 ; 1 ; 1 ; 1 ; 0\}$ (Plus means OR Logical Test)
3. (A16:A22=E16)*(B16:B22=F16) $\rightarrow$ \{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\}*\{TRUE;FALSE;FALSE;TRUE;FALSE;FALSE;FAL SE\} $\rightarrow\{1 ; 0 ; 0 ; 0 ; 0 ; 0 ; 0\}$ (Multiplication means AND Logical Test)

## AND Logical Test (AND Criteria)

1) AND Logical Test (using AND Criteria):

- The Goal of an AND Logical Test is to run two or more logical tests and see if ALL logical tests evaluate to TRUE.
- Think of: "If you take out the garbage AND clean the table, you get desert". Only if you get two TRUEs (took out garbage AND cleaned the table) do you get desert.
- For an AND Logical Test with two tests we can get these possible answers:

1. TRUE, FALSE
2. FALSE, TRUE
3. FALSE, FALSE
4. TRUE, TRUE.

- Only \#4 example (TRUE, TRUE) will yield a TRUE from the AND Logical Test.
- For an AND Logical Test to evaluate to TRUE, you must get "All Are TRUE".
- Functions that can perform AND Logical Tests:

1. AND function
2. SUMIFS, COUNTIFS, AVERAGEIFS and other similar functions (default behavior when you use more than one criteria_range and more than on criteria)
3. D Functions: AND Criteria goes on same row.
4. IF function
i. You can use the AND function in the logical_test argument to deliver a single TRUE or FALSE.
ii. If you are creating array formulas:
5. You can nest multiple IF functions
or
6. Multiply Arrays with TRUEs and FALSEs (Multiplication means AND)

## AND function

1) Performs AND Logical Test.
2) Enter 2 or more logical tests into AND function separated by commas.

- AND interprets:

1. Any non-zero number and TRUE as TRUE.
2. Zero and FALSE as FALSE.
3) AND function delivers a TRUE only when all logical tests evaluate to TRUE.

- Example:

| 4 | B | C | D | E | F | G | H | 1 | J | K | L | M | N |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Region | SalesRep | Customer | Product | COGS | Sales | AND Function |  | AND Logical Test (AND Criteria) $=$ All Must be TRUE |  |  |  |  |  |
| 2 | West | Gigi | Amazon | AIM Item | 3,643 | 6,279 | FALSE | H2: $=$ AND(B2=\$J\$9,C2=\$K\$9,E2=\$1\$9) |  |  |  |  |  |  |
| 3 | South | Gigi | Fred Myer | DAB Item | 8,815 | 9,428 | TRUE | $\mathrm{H} 3:=\mathrm{AND}(\mathrm{B3}=\$ \mathrm{~J} \$ 9, \mathrm{C} 3=\$ \mathrm{~K} \$ 9, \mathrm{E} 3=\$ 1 \$ 9)$ | AND Function: |  |  |  |  |  |
| 4 | South | Mo | Peet's | XOL Item | 3,190 | 7,417 | FALSE |  |  |  |  |  |  |  |
| 5 | South | Pham | HD | RAD Item | 3,636 | 6,270 | FALSE |  |  |  |  |  |  |  |
| 6 | South | Gigi | HD | DAB Item | 5,247 | 5,610 | TRUE |  | AND Criteria: |  |  |  |  |  |
| 7 | West | Gigi | McLendon's | RAD Item | 2,984 | 5,424 | FALSE |  | Question is: Is the Region South AND is the SalesRep Gigi AND is the Product DAB Item? |  |  |  |  |  |
| 8 | South | Shelia | Fred Myer | XOL Item | 6,386 | 6,830 | FALSE |  | Region | SalesRep | Product |  |  |  |
| 9 | West | Mo | HD | RAD Item | 1,175 | 2,611 | FALSE |  | South | Gigi | DAB Item |  |  |  |

## SUMIFS, COUNTIFS, AVERAGEIFS functions with AND Criteria

1) If we enter more than one criteria_range argument and more than one criteria argument into SUMIFS, COUNTIFS or AVERAGEIFS we are performing an AND Logical Test with AND Criteria.
2) Example of AND Logical Test with AND Criteria:

- Each of the functions below have 3 ranges in criteria_range argument (Region, SalesRep, Product) and 3 criteria in criteria argument (South, Gigi, DAB Item).
- Only when a record is found with Region = South AND SalesRep = Gigi AND Product = DAB Item, will the record be included in calculation.

| 4 | B | C | D | E | F | G | H |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Region | SalesRep | Customer | Product | COGS | Sales | AND Function |
| 2 | West | Gigi | Amazon | AIM Item | 3,643 | 6,279 | FALSE |
| 3 | South | Gigi | Fred Myer | DAB Item | 8,815 | 9,428 | TRUE |
| 4 | South | Mo | Peet's | XOL Item | 3,190 | 7,417 | FALSE |
| 5 | South | Pham | HD | RAD Item | 3,636 | 6,270 | FALSE |
| 6 | South | Gigi | HD | DAB Item | 5,247 | 5,610 | TRUE |
| 7 | West | Gigi | McLendon's | RAD Item | 2,984 | 5,424 | FALSE |
| 8 | South | Shelia | Fred Myer | XOL Item | 6,386 | 6,830 | FALSE |
| 9 | West | Mo | HD | RAD Item | 1,175 | 2,611 | FALSE |
| 10 | MidWest | Gigi | Costco | DAB Item | 2,792 | 4,811 | FALSE |
| 11 | South | Mo | OD | XOL Item | 16 | 23 | FALSE |
| 12 | North | Pham | Economist | DAB Item | 7,222 | 8,206 | FALSE |
| 13 | North | Pham | HD | AIM Item | 4,648 | 8,450 | FALSE |
| 14 | West | Mo | McLendon's | RAD Item | 1,264 | 2,144 | FALSE |
| 15 | MidWest | Gigi | Peet's | RAD Item | 3,607 | 6,113 | FALSE |
| 16 | minuth | nh | nantlo | nisaltam | ากィ | ว7ข | A |



## BETWEEN Logical Test

1) BETWEEN Logical Test is a form of AND Logical Test that has an upper and lower limit.
2) Only items that are between the upper and lower limit are included.
3) Example 1:

|  | K | L | M | N | 0 | P | Q | R | S | T |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 26 | Question is: Is the Date for the Record Between the Upper and Lower Limit? |  |  |  |  |  |  |  |  |  |
| 27 | Lower Limit | Upper Limit | Count  <br> Transactions Total Sales (\$) |  |  |  |  |  |  |  |
| 28 | 1/1/2013 | 1/31/2013 | 98 | 446,305 |  | M28: =COUNTIFS(Date,">="\&K28,Date,"<="\&L28) |  |  |  |  |
| 29 | 2/1/2013 | 2/28/2013 | 66 | 289,246 |  | N28: =SUMIFS(Sales,Date,">="\&K28,Date,"<="\&L28) |  |  |  |  |
| 30 | 3/1/2013 | 3/31/2013 | 101 | 477,170 |  |  |  |  |  |  |
| 31 | 4/1/2013 | 4/30/2013 | 69 | 347,293 |  |  |  |  |  |  |
| 32 | 5/1/2013 | 5/31/2013 | 96 | 492,240 |  |  |  |  |  |  |
| 33 | 6/1/2013 | 6/30/2013 | 74 | 389,902 |  |  |  |  |  |  |
| 34 | 7/1/2013 | 7/31/2013 | 74 | 395,934 |  |  |  |  |  |  |
| 35 | 8/1/2013 | 8/31/2013 | 98 | 465,471 |  |  |  |  |  |  |
| 36 | 9/1/2013 | 9/30/2013 | 83 | 438,576 |  |  |  |  |  |  |
| 37 | 10/1/2013 | 10/31/2013 | 87 | 453,616 |  |  |  |  |  |  |
| 38 | 11/1/2013 | 11/30/2013 | 73 | 384,776 |  |  |  |  |  |  |
| 39 | 12/1/2013 | 12/31/2013 | 85 | 443,020 |  |  |  |  |  |  |

4) Example 2:

- EOMONTH function calculates the end of a given month.
-1 gives end of last month
0 gives end of this month
1 gives end of next month

| 4 | X | Y | Z | AA | $A B$ | AC | AD | AE | AF |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 26 | Question is: Please Count all the transactions for the month. |  |  |  |  |  |  |  |  |
| 27 | Lower Limit | Count Transactions |  |  |  |  |  |  |  |
| 28 | 1/1/2013 | 98 |  | Y28: =COUNTIFS(Date,">="\& ${ }^{\text {a }}$ ( ${ }^{\text {a }}$,Date,"<="\&EOMONTH(X28,0)) |  |  |  |  |  |
| 29 | 2/1/2013 | 66 |  | Y29: =COUNTIFS(Date,">="\& ${ }^{\text {(29,Date,"<="\&EOMONTH(X29,0)) }}$ |  |  |  |  |  |
| 30 | 3/1/2013 | 101 |  |  |  |  |  |  |  |
| 31 | 4/1/2013 | 69 |  |  |  |  |  |  |  |
| 32 | 5/1/2013 | 96 |  |  |  |  |  |  |  |
| 33 | 6/1/2013 | 74 |  |  |  |  |  |  |  |
| 34 | 7/1/2013 | 74 |  |  |  |  |  |  |  |
| 35 | 8/1/2013 | 98 |  |  |  |  |  |  |  |
| 36 | 9/1/2013 | 83 |  |  |  |  |  |  |  |
| 37 | 10/1/2013 | 87 |  |  |  |  |  |  |  |
| 38 | 11/1/2013 | 73 |  |  |  |  |  |  |  |
| 39 | 12/1/2013 | 85 |  |  |  |  |  |  |  |

5) Example 3: Count Number Sales between an Upper and Lower Limit

| 4 | K | L | M | N | $\bigcirc$ | P | Q | R | s | Count Between Upper \& Lower Limit: |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 41 | Question is: Co | Ount Sales Amou | unts that were | ent | per and L | Limit. |  |  |  |  |  |
| 42 | We have to be careful when the Upper and Lower of two categories are the same. Equal sign on only one. |  |  |  |  |  |  |  |  |  |  |
| 43 | Lower Limit | Upper Limit | Count |  |  |  |  |  |  |  |  |
| 44 | 0 | 1000 | 182 |  | M44: =CC | IFSS(Sales, | '>="\&K4 | ,ses,"<" |  | 1) | COUNTIFS allows you |
| 45 | 1000 | 2000 | 200 |  | M45: = ${ }^{\text {c }}$ | IFSS(Sale | ">="\&K4 | , les,"<" |  |  | control over comparative |
| 46 | 2000 | 3000 | 208 |  |  |  |  |  |  |  | Operators. |
| 48 | 3000 | 4000 | 205 |  |  |  |  |  |  | 2) | FREQUENCY Array |
| 48 | 4000 | 5000 | 212 |  |  |  |  |  |  | 2) | FREQUENCY Array |
| 49 | 5000 | 6000 | 181 |  |  |  |  |  |  |  | Function dictates the |
| 50 | 6000 | 7000 | 196 |  |  |  |  |  |  |  | Comparative Operators |
| 52 | 8000 | 9000 | 216 |  |  |  |  |  |  |  | and categories (See Array |
| 53 | 9000 | 10000 | 193 |  |  |  |  |  |  |  | Formulas Handout \#5). |

## D Functions (Database functions)

1) $D$ functions (Database functions):

- Set of functions that make aggregate calculations using a Proper Data Set.
- The D Functions communicate with the Proper Data Set based on Field Names.
- D Functions are hard to copy to other cells. You can't create cross tabulated formula tables with D Functions because you can't copy the formula and have the criteria area adjust.

2) List of $D$ Functions (thanks to CPearson.com)

- DAVERAGE returns the Average of the data specified by the criteria range - DCOUNT returns the Count (numeric values only) of data specified by the criteria range - DCOUNTA returns the CountA (all non-empty) of the data specified by the criteria range - DGET returns a single element of the data specified by the criteria range - DMAX returns the Maximum of the data specified by the criteria range
- DMIN
- DPRODUCT
- DSTDEV
- DSTDEVP
- DSUM
- DVAR
- DVARP
returns the Minimum of the data specified by the criteria range returns the Product (multiplication) of the data specified by the criteria range returns Standard Deviation of a sample on the data specified by criteria range returns Standard Deviation of population of data specified by the criteria range returns the Sum of the data specified by the criteria range returns Variance of sample of population of the data specified by criteria range returns Variance of entire population of data specified by the criteria range

3) $D$ function arguments:

- D Function arguments look like: DFunction(database,field,criteria)

Example: =DCOUNT(A1:G2000,"Sales",J67:N68)

- database = Must be a Proper Data Set with Field Names.
- field = Name of field you want to make a calculation on

1. Field can be: Name of field like: "Sales" or Relative position amongst other field names, like: 7
2. If Sales is the $7^{\text {th }}$ field in the database and you are counting sales that meet the criteria you can use:
```
=DCOUNT(A1:G2000,"Sales",J67:N68)
or
=DCOUNT(A1:G2000,7,J67:N68)
```

- criteria $=$

1. Field Names must be above criteria. This is so $D$ functions can communicate with Database.
2. Must include criteria in cell and Comparative Operator (for equal sign use lead apostrophe, like: '=West).
3. If you do not use a comparative operator, like typing just West, you are telling the D Functions to use "Contains" Criteria (Sometimes called "Partial Text" Criteria). This means that the Criteria "West" would find West and NorthWest and Western.
4. AND Criteria is listed in same row.
5. OR Criteria is listed on different rows.
4) Example of setup for D Functions are listed next two sections.

## D Functions: AND Criteria is listed in same row

1) In the Criteria area:

- Field Names are listed above criteria
- AND Criteria is listed in same row.

2) Example:

| , | J | K | L | M | N | O | P |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 66 | Question is: Is Date in 4th Quarter AND is the Region West AND is the SalesRep Gigi AND is the Product AIM Item? |  |  |  |  |  |  |  |
| 67 | Date | Date | Region | SalesRep | Product |  |  |  |
| 68 | >=10/1/2013 | <=12/31/2013 | =West | =Gigi | =AIM Item |  |  |  |
| 69 |  |  |  |  |  |  |  |  |
| 70 | Field calculating on: | Sales |  |  |  |  |  |  |
| 71 | Count | 7 |  | K71: = DC | (A1:G2000, |  |  |  |
| 72 | Total | 24,978 |  | K72: = DSU | 1:G2000,K7 |  |  |  |
| 73 | Average | 3,568 |  | K73: =DA | GE(A1:G200 | N68) |  |  |
| 74 | Standard Deviation | 2,506 |  | K74: =DS | (A1:G2000, | 68) |  |  |

## D Functions: OR Criteria is listed in different rows

1) In the Criteria area:

- Field Names are listed above criteria
- OR Criteria is listed on different rows.

2) D Function OR Criteria looking at one column example:

| 1 | J | K | L | M | N | 0 | P |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 42 | D Functions: |  |  |  |  |  |  |
| 43 | OR Criteria acting one one column: |  |  |  |  |  |  |
| 44 | Question is: Is the Customer Amazon OR Microsoft OR Yahoo OR Google? |  |  |  |  |  |  |
| 45 |  | Customer |  |  |  |  |  |
| 46 |  | Amazon |  |  |  |  |  |
| 47 |  | Microsoft |  |  |  |  |  |
| 48 |  | Yahoo |  |  |  |  |  |
| 49 |  | Google |  |  |  |  |  |
| 50 | Total Sales | 3,515,181 |  | K50: =DS | 200 | s", |  |
| 51 | Count Transactions | 688 |  | K51: = DC | :G2 | Sales | 49) |

3) D Function OR Criteria looking at two columns example (Empty cells mean "any item"):

- Notice that in order to perform OR Criteria on different columns we have to include empty cells to tell the $D$ functions to find anything that goes along with the OR Criteria. For example, in the below example the question really is: "Find Gigi in the SalesRep column with any customer name OR find Amazon in the Customer column with any SalesRep name".



## Math Operators and Logical Tests (Boolean Calculations)

1) Math Operators can be used to perform Logical Tests.
2) When we use Math Operators to make Logical Tests we call the calculation a "Boolean Calculation".
3) TRUEs and FALSEs are sometimes called "Boolean" values.
4) Any Math Operation (+, $-,^{*}, ?,{ }^{\wedge}$ ) on Boolean values will convert TRUE to 1 and FALSE to 0.
5) Logical Tests with Math Operators:

## - AND Logical Tests use Multiplication

1. Single cell example:

TRUE * TRUE = 1 = TRUE
FALSE * TRUE $=0=$ FALSE
TRUE * FALSE $=0=$ FALSE
FALSE * FALSE $=0=$ FALSE
2. Array formula example (Called: AND Logical Test Array Operation):
$(\mathrm{A} 16: \mathrm{A} 22=\mathrm{E} 16)^{*}(\mathrm{~B} 16: \mathrm{B} 22=\mathrm{F} 16) \rightarrow$
\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\}*\{TRUE;FALSE;FALSE;TRUE;FALSE;F
ALSE;FALSE\} $\rightarrow$ \{1;0;0;0;0;0;0\}
1 = TRUE
0 = FALSE

- OR Logical Tests use Addition

1. Single cell example:

TRUE + TRUE $=2=$ TRUE
FALSE + TRUE = 1 = TRUE
TRUE + FALSE = 1 = TRUE
FALSE + FALSE $=0=$ FALSE
2. Array formula example (Called: OR Logical Test Array Operation):

```
(A16:A22=E16)+(B16:B22=F16) }
{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE}+{TRUE;FALSE;FALSE;TRUE;FALSE;F
ALSE;FALSE} }->{2;1;0;1;1;1;0
1 = TRUE
2 = TRUE
0 = FALSE
```


## Standard Deviation calculation with AND Criteria: STDEV.S \& IF Functions Array Formula

1) There is no built-in STDEVSIF function so we have to create an Array Formula that will filter out the values we don't want to use in the calculation.
2) To calculate the standard deviation of the sample based on conditions or criteria, we can use the STDEV.S and IF functions and an AND Logical Test Array Operation.
3) Example:

| A |  |  |  |  |  |  | B | C |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

4) How the AND Logical Test Array Operation calculates:
1. $=$ STDEV.S(IF(A4:A10=E4,IF(B4:B10=F4,C4:C10)))
i. Because we have two AND criteria, we use two IF functions.
2. =STDEV.S(IF(\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\},IF(B4:B10=F4,C4:C10)))
3. =STDEV.S(IF(\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\},IF(\{TRUE;FALSE;FALSE;TRUE;TRUE;FALSE;FALSE \},C4:C10)))
4. =STDEV.S(IF(\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\},IF(\{TRUE;FALSE;FALSE;TRUE;TRUE;FALSE;FALSE \},\{6279;9428;7417;6270;5610;2546;1987\})))
5. =STDEV.S(IF(\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\},IF(\{TRUE;FALSE;FALSE;TRUE;TRUE;FAL SE;FALSE\},\{6279;9428;7417;6270;5610;2546;1987\})))
i. Only when there is a TRUE in the first AND second Resultant Array (both in the same relative position) will the number be picked out to use in the STDEV.S function.
6. =STDEV.S(\{6279;FALSE;FALSE;FALSE;5610;FALSE;FALSE\})
i. FALSE values "filter" out numbers we don't want in AVERAGE function.
7. 473.05

## OR Logical Test (OR Criteria)

1) OR Logical Test (using OR Criteria):

- The Goal of an OR Logical Test is to run two or more logical tests and see if at least one logical tests evaluate to TRUE.

1. Think of: "If you take out the garbage OR clean the table, you get desert".
i. If you take out the garbage, you get desert.
ii. If you clean the table, you get desert.
iii. If you do neither, you do NOT get desert.
iv. If you do both, you get desert.

- For an OR Logical Test with two tests we can get these possible answers:

1. TRUE, FALSE
2. FALSE, TRUE
3. FALSE, FALSE
4. TRUE, TRUE.
i. \#1, \#2 and \#4 will yield a TRUE from the OR Logical Test.
ii. \#1, \#2 and \#4 each yield at least one TRUE.

- For an OR Logical Test to evaluate to TRUE, you must get "At Least One TRUE".
- Functions that can perform OR Logical Tests:

1. OR function
2. SUMIFS and COUNTIFS if you do a Function Argument Array Operation in the criteria argument and the criteria are all in the same column.
i. For SUMIFS and COUNTIFS you can use the SUMPRODUCT function to add the resultant array and avoid Ctrl + Shift + Enter.
3. D Functions (OR Criteria goes on different rows (lines).
4. IF function
i. You can use the OR function in the logical_test argument to deliver a single TRUE or FALSE.
ii. If you are creating array formulas
5. Add Arrays with TRUEs and FALSEs (Adding means OR)

## OR function

1) Performs OR Logical Test:
2) Enter 2 or more logical tests into OR function separated by commas.

- OR interprets:

1. Any non-zero number and TRUE $=$ TRUE.
2. Zero and FALSE $=$ FALSE.
3) OR function delivers a TRUE when at least one of the logical tests evaluate to TRUE.

- Example:

| 4 | D | E | F | G | H | I | J | K | L | M |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Customer | Product | COGS | Sales | OR Function |  | OR Logical Test (OR Criteria) $=$ At Least One Must Be TRUE |  |  |  |
| 2 | Amazon | AIM Item | 3,643 | 6,279 | TRUE | H2: =OR(D2=\$K\$9,D2=\$K\$10,D2=\$K\$11,D2=\$K\$12) |  |  |  |  |
| 3 | Fred Myer | DAB Item | 8,815 | 9,428 | FALSE | H3: =OR(D3=\$K\$9,D3=\$K\$10,D3=\$K\$11,D3=\$K\$12) | OR Function: |  |  |  |
| 4 | Peet's | XOL Item | 3,190 | 7,417 | FALSE |  | Delivers TRUE when at least one logical test evaluates to TRUE. |  |  |  |
| 5 | HD | RAD Item | 3,636 | 6,270 | FALSE |  |  |  |  |  |
| 6 | HD | DAB Item | 5,247 | 5,610 | FALSE |  | OR Criteria acting one one column: |  |  |  |
| 7 | McLendon's | RAD Item | 2,984 | 5,424 | FALSE |  | Question is: Is the Customer Amazon OR Microsoft OR Yahoo OR Google? |  |  |  |
| 8 | Fred Myer | XOL Item | 6,386 | 6,830 | FALSE |  |  | Customer Group 1 |  |  |
| 9 | HD | RAD Item | 1,175 | 2,611 | FALSE |  |  | Amazon |  |  |
| 10 | Costco | DAB Item | 2,792 | 4,811 | FALSE |  |  | Microsoft |  |  |
| 11 | OD | XOL Item | 16 | 23 | FALSE |  |  | Yahoo |  |  |
| 12 | Microsoft | DAB Item | 7,222 | 8,206 | TRUE |  |  | Google |  |  |

## OR Criteria looking at one column using SUMIFS and COUNTIFS

1) If we put multiple items into the criteria argument of SUMIFS or COUNTIFS we are:

- Making a Function Argument Array Operation
- Performing OR Criteria on a single column.

2) Example of OR Logical Test with OR Criteria:

|  | D | E | F | G | H |
| :---: | :--- | :--- | ---: | ---: | :---: |
| 1 | Customer | Product | COGS | Sales | OR Function |
| 2 | Amazon | AIM Item | 3,643 | 6,279 | TRUE |
| 3 | Fred Myer | DAB Item | 8,815 | 9,428 | FALSE |
| 4 | Peet's | XOL Item | 3,190 | 7,417 | FALSE |
| 5 | HD | RAD Item | 3,636 | 6,270 | FALSE |
| 6 | HD | DAB Item | 5,247 | 5,610 | FALSE |
| 7 | McLendon's | RAD Item | 2,984 | 5,424 | FALSE |
| 8 | Fred Myer | XOL Item | 6,386 | 6,830 | FALSE |
| 9 | HD | RAD Item | 1,175 | 2,611 | FALSE |
| 10 | Costco | DAB Item | 2,792 | 4,811 | FALSE |
| 11 | OD | XOL Item | 16 | 23 | FALSE |
| 12 | Microsoft | DAB Item | 7,222 | 8,206 | TRUE |
| 13 | HD | AIM Item | 4,648 | 8,450 | FALSE |
| 14 | McLendon's | RAD Item | 1,264 | 2,144 | FALSE |



Average calculation with OR Criteria: AVERAGE \& Array Formula (for 1 or more columns)
5) We can't use AVERAGEIFS with a Function Argument Array Operation because the Resultant Array delivers multiple averages that cannot then be used to calculate an average (for an average you must have just one total in numerator and one count in denominator).
6) To calculate an average based on conditions or criteria, we can use the AVERAGE and IF functions and an OR Logical Test Array Operation.
7) Example where OR Criteria is looking at one column:

| 4 | A | B | C | D | E | F | G |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 12 | Example where OR Criteria is looking at one column: |  |  |  |  |  |  |
| 13 |  |  |  |  |  |  |  |
| 14 | Customer | Sales |  |  | OR Criteria: |  |  |
| 15 | Amazon | 6,279 |  |  | Amazon |  |  |
| 16 | Google | 9,428 |  |  | Google |  |  |
| 17 | Microsoft | 7,417 |  |  |  |  |  |
| 18 | Amazon | 6,270 |  |  | Average |  |  |
| 19 | Microsoft | 5,610 |  |  | 7,326 |  | E19: $\{=A V E R A G E(I F((A 15: A 19=E 15)+(A 15: A 19=E 16), B 15: B 19))\} ~$ |

8) How the OR Logical Test Array Operation calculates:
1. =AVERAGE(IF((A2:A6=D2)+(A2:A6=D3),B2:B6))
2. =AVERAGE(IF(\{TRUE;FALSE;FALSE;TRUE;FALSE\})+(A2:A6=D3),B2:B6))
3. =AVERAGE(IF((\{TRUE;FALSE;FALSE;TRUE;FALSE\})+(\{FALSE;TRUE;FALSE;FALSE;FALSE\}),B2:B6))
i. Any math operation on TRUEs and FALSEs convert them to 1 s and 0 s .
4. =AVERAGE(IF(\{1;1;0;1;0\},B2:B6))
i. Notice that we only get 0 s or 1 s because the question is asked of one column.
ii. The Resultant Array of 1 s and 0 s sits in the logical_test argument of the IF function. The logical_test argument interprets any non-zero number as TRUE and 0 as FALSE.
5. =AVERAGE(\{6279;9428;FALSE;6270;FALSE\})
i. FALSE values "filter" out numbers we don't want in AVERAGE function.
6. 7325.66666666667
9) Example where OR Criteria is looking at two columns (we have to worry about Double Counting):

| 2 | A | B | C | D | E | F | G |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 24 | Example where OR Criteria is looking at two columns (we have to worry about Double Counting): |  |  |  |  |  |  |
| 25 |  |  |  |  |  |  |  |
| 26 | SalesRep | Customer | Sales |  | SalesRep | Customer |  |
| 27 | Gigi | Amazon | 6,279 |  | Gigi | Amazon |  |
| 28 | Gigi | Google | 9,428 |  |  |  |  |
| 29 | Mo | Microsoft | 7,417 |  | Average |  |  |
| 30 | Pham | Amazon | 6,270 |  | 6,027 |  | E30: $\{=$ AVERAGE(IF((A27:A33=E27)+(B27:B33=F27),C27:C33)) |
| 31 | Gigi | Amazon | 5,610 |  |  |  |  |
| 32 | Gigi | McLendon's | 2,546 |  |  |  |  |
| 33 | Shelia | Fred Myer | 1,987 |  |  |  |  |

10) How the OR Logical Test Array Operation calculates:
1. =AVERAGE(IF((A16:A22=E16)+(B16:B22=F16),C16:C22))
2. =AVERAGE(IF((\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE $\})+(B 16: B 22=F 16), C 16: C 22))$
3. =AVERAGE(IF((\{TRUE;TRUE;FALSE;FALSE;TRUE;TRUE;FALSE\})+(\{TRUE;FALSE;FALSE;TRUE;FALSE;F ALSE;FALSE\}),C16:C22))
i. Any math operation on TRUEs and FALSEs convert them to 1 s and 0 s .
4. =AVERAGE(IF(\{2;1;0;1;1;1;0\},C16:C22))
i. Notice that we get 0 s or 1 s or 2 s because the question is asked of two columns.
ii. The Resultant Array of 2 s and 1 s and 0 s sits in the logical_test argument of the IF function. The logical_test argument interprets any non-zero number as TRUE and 0 as FALSE.
5. =AVERAGE(\{6279;9428;FALSE;6270;5610;2546;FALSE $\}$ )
i. FALSE values "filter" out numbers we don't want in AVERAGE function.
6. 6026.6

Credit Analysis for Accounts Receivable Department with AND and OR Criteria

| 4 | A | B | C | D | E | F | G | H | I | J |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Our job in the AR Department is to access whether we should extend credit to customers. |  |  |  |  |  |  |  |  |  |
| 2 | Rule \#1: | Sales Last Year >\$250,000 AND Asset Value >\$300,000 AND Credit Rating $1>=3$ |  |  |  |  |  |  |  |  |
| 3 | Rule \#2: | At least 1 of the credit ratings is exceeded. |  |  |  |  |  |  |  |  |
| 4 | Rule \#3: | Sales Last Year $>\$ 250,000$ AND Asset Value $>\$ 300,000$ AND Late Payments Last Year $<2$ AND at least one of the credithurdles is exceeded. |  |  |  |  |  |  |  |  |
| 6 |  | Sales Last Year | Asset Value | Late Payments Last Year | Credit <br> Rating 1 | Credit <br> Rating 2 |  |  |  |  |
| 7 |  | \$250,000 | \$300,000 | 2 | 3 | 7 |  |  |  |  |
| Customer Information: |  |  |  |  |  |  |  |  |  |  |
| 10 | Name | Sales Last <br> Year | Asset Value | Late Payments Last Year | Credit <br> Rating 1 | Credit Rating 2 | Rule 1 | Rule 2 | Rule 3 | IF For Rule 3 |
| 11 | Birch Stores Inc. | \$250,000 | \$370,000 |  | 2.4 | 7 | FALSE | FALSE | FALSE | No Credit |
| 12 | RAD Web Design | \$430,313 | \$392,808 | 4 | 3.1 | 9 | TRUE | TRUE | FALSE | Credit |
| 13 | Blue Acorn Design | \$280,396 | \$111,622 | 2 | 2.7 | 7.1 | FALSE | TRUE | FALSE | No Credit |
| 14 | Shark Logistics Co. | \$280,306 | \$370,448 | 1 | 4 | 5 | TRUE | TRUE | TRUE | Credit |
| 15 | Foggy Camel Vacations | \$454,172 | \$369,208 |  | 3.5 | 6.8 | TRUE | TRUE | TRUE | Credit |
| 16 | Battalion's Moving Inc. | \$270,797 | \$277,251 | 1 | 2.9 | 2 | FALSE | FALSE | FALSE | No Credit |
| 17 |  |  |  |  |  |  |  |  |  |  |
| 18 |  |  |  | G11: =AND(B11>\$B\$7,C11>\$C\$7,E11>=\$E\$7) |  |  |  |  |  |  |
| 19 |  |  |  | H11: =OR(E11>\$E\$7,F11>\$F\$7) |  |  |  |  |  |  |
| 20 |  |  |  | I11: =AND(B11>\$B\$7,C11>\$C\$7,D11<\$D\$7,OR(E11>\$E\$7,F11>\$F\$7)) |  |  |  |  |  |  |
| 21 |  |  |  | J11: =IF(AND(B11>\$B\$7,C11>\$C\$7,D11<\$D\$7,OR(E11>\$E\$7,F11>\$F\$7)),"Credit","No Credit") |  |  |  |  |  |  |

## IF Function

1) Use IF function to put one of two things into a cell or formulas:

- Two things can be:

1. Two Numbers.
2. Two Words (Text).
3. Two Formulas.
4. Two anything.
5. logical_test argument is where you put your Logical Test.
i. logical_test interprets:
6. Any non-zero number and TRUE as TRUE.
7. Zero and FALSE as FALSE.
ii. logical_test can contain:
8. Single logical test like: A1>=B3
9. An array operation like: A16:A22=E16
10. AND function
11. OR function
12. ISNUMBER function
13. ISTEXT function
14. Any other Logical Function
15. Cell references with TRUEs or FALSES or Numbers
16. Numbers

- value_if_true argument is what will go in cell if Logical Formula gets a TRUE.
- value_if_false argument is what will go in cell if Logical Formula gets a FALSE.

2) Rule for using IF when you have more than 2 things to put into a cell:

- As long as there are still more than 1 possibility left, keep adding more IFs to the value_if_false argument.
- When there is only one option left, just put the last option into the value_if_false argument.
- At the end, keep typing "close parenthesis until you see the black one.


## IS functions

1) IS Functions allow you to ask a question and get a TRUE or FALSE answer.
2) Types of questions that you ask with IS Functions:

- Is the value a Number?
- Is the value Text?
- Is the value a formula?

3) List of ISFUNCTIONS:

- ISNUMBER(value) Value refers to a number.
- ISTEXT(value) Value refers to text.
- ISBLANK(value) Value refers to an empty cell.
- ISERROR(value) Value refers to any error value.
- ISNA(value) Value refers to the \#N/A error value.
- ISERR(value) Value refers to any error value except \#N/A.
- ISNONTEXT(value) Value refers to any item that is not text.
- ISLOGICAL(value) Value refers to a logical value.
- ISFORMULA(value) Value refers to a formula


## Conditional Calculations: PivotTable or Formulas?

1) Things to consider when deciding whether to use Formulas or PivotTables for Calculations with Conditions or Criteria:

- If the solution needs to instantly update when formula inputs or source data changes, then formulas are preferable.
- If you are making aggregate calculations with many criteria and you don't need the solution to update instantly when source data changes, then PivotTables are preferable.
- There are more functions in an Excel spreadsheet than there are in a PivotTable.
- PivotTable only do Aggregate Calculations.
- For Big Data formulas calculate slowly.
- PivotTables are easy to create.
- Sometimes it is easier to create your solution with formulas, sometimes it is easier with a PivotTable.

1. Example: Calculating totals for months is usually easier in a PivotTable:

| 8 | Date | Units |  |  | Months |  |
| :---: | ---: | ---: | :--- | :--- | ---: | ---: |
| 9 | $3 / 10 / 2016$ | 338 |  | Sum of Units |  |  |
| 10 | $3 / 14 / 2016$ | 556 |  | Feb | 625 |  |
| 11 | $1 / 28 / 2016$ | 124 |  | Mar | 1,199 |  |
| 12 | $1 / 16 / 2016$ | 205 |  | Grand Toti | 1,181 |  |
| 13 | $2 / 29 / 2016$ | 311 |  |  |  |  |
| 14 | $2 / 4 / 2016$ | 484 |  |  |  |  |
| 15 | $3 / 9 / 2016$ | 287 |  |  |  |  |
| 16 | $1 / 8 / 2016$ | 296 |  |  |  |  |
| 17 | $2 / 5 / 2016$ | 167 |  |  |  |  |
| 18 | $2 / 21 / 2016$ | 237 |  |  |  |  |

2. Some OR Criteria Calculations are easier to do with formulas:

| 4 | A | B | $c$ | D | E | F | G | H | 1 | 1 | K | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Create a formula that can add sales based on Sales Team and Region. |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | Sales Rer Sales |  | Region |  |  | Sales Team 1 | Sales Team 2 | Sales Team 3 | Sales Team 4 |  |  |  |
| 4 | Kip | 457 | North America |  |  | June | Gigi | Fred | Irene |  |  |  |
| 5 | June | 368 | North America |  |  | Sioux | Chin | Kip | Al |  |  |  |
| 6 | Gigi | 725 | South America |  |  | Poppi | Sandi | Abdi | Mel |  |  |  |
| 7 | Mel | 736 | South America |  |  | Tyrone | Shelia | Pham | Mo |  |  |  |
| 8 | Tyrone | 606 | South America |  | North America | 5301 | 8162 | 6211 | 2499 |  |  |  |
| 9 | Chin | 1418 | South America |  | South America | 4307 | 5469 | 2929 | 2025 |  |  |  |
| 10 | Abdi | 1110 | South America |  |  |  |  |  |  |  |  |  |
| 11 | Sandi | 1489 | North America |  | Check: | Sales Rep | (Multiple it $]_{\text {, }}^{\text {s }}$ ) |  |  | <<= Takes Longer t | reat | tTAbles |
| 12 | June | 175 | North America |  |  |  |  |  |  |  |  |  |
| 13 | Shelia | 1354 | South America |  |  | Row Labels $\checkmark$ | Sum of Sales |  |  |  |  |  |
| 14 | Pham | 132 | North America |  |  | North America | 5301 |  |  |  |  |  |
| 15 | Gigi | 449 | South America |  |  | South America | 4307 |  |  |  |  |  |
| 16 | Mo | 1333 | North America |  |  | Grand Total | 9608 |  |  |  |  |  |
| 17 | Sandi | 1571 | North America |  |  |  |  |  |  |  |  |  |
| 18 | Chin | 1553 | North America |  |  |  | Sales Rep | (Multiple it $\mathrm{T}_{5}$ ) |  |  |  |  |
| 19 | Tyrone | 1196 | South America |  |  |  |  |  |  |  |  |  |
| 20 | June | 679 | North America |  |  |  | Row Labels S | Sum of Sales |  |  |  |  |
| 21 | Pham | 221 | South America |  |  |  | North America | 8162 |  |  |  |  |
| 22 | Pham | 1097 | North America |  |  |  | South America | 5469 |  |  |  |  |
| 23 | Gigi | 473 | North America |  |  |  | Grand Total | 13631 |  |  |  |  |
| 24 | Tyrone | 573 | South America |  |  |  |  |  |  |  |  |  |
| 25 | Gigi | 1160 | South America |  |  |  |  | Sales Rep | (Multiple it $\mathbf{T}_{\mathbf{T}}$ ) |  |  |  |
| 26 | June | 1268 | North America |  |  |  |  |  |  |  |  |  |
| 27 | Sandi | 1635 | North America |  |  |  |  | Row Labels - | Sum of Sales |  |  |  |
| 28 | Mel | 152 | North America |  |  |  |  | North America | 6211 |  |  |  |
| 29 | Poppi | 603 | North America |  |  |  |  | South America | 2929 |  |  |  |
| 30 | Irene | 458 | North America |  |  |  |  | Grand Total | 9140 |  |  |  |
| 31 | Sioux | 741 | South America |  |  |  |  |  |  |  |  |  |
| 32 | Fred | 486 | North America |  |  |  |  |  | Sales Rep | (Multiple Items -T] |  |  |
| 33 | Tyrone | 1227 | North America |  |  |  |  |  |  |  |  |  |
| 34 | Poppi | 981 | North America |  |  |  |  |  | Row Labels - | Sum of Sales |  |  |
| 35 | Fred | 798 | North America |  |  |  |  |  | North America | 2499 |  |  |
| 36 | Sioux | 1191 | South America |  |  |  |  |  | South America | 2025 |  |  |
| 37 | Gigi | 363 | South America |  |  |  |  |  | Grand Total | 4524 |  |  |

## Defined Name Scope

1）If you use the same name for a Defined Name on a different sheet，then：
－The first name used has a＂Workbook Scope＂and can be used and accessed on any sheet
－Any subsequent names used have a＂Worksheet Scope＂and can be accessed and used on the sheet that they were created（If you want to use the Worksheet Defined Name on different sheet you can place a sheet reference in from of it like：OR！COGS）
2）Example：

| Name Manager |  |  |  | 8 $x$ |
| :---: | :---: | :---: | :---: | :---: |
| New．．． | it．．．Del |  |  | Eilter＊ |
| Name | Value | Refers To | Scope | Cc |
| 自COGS | ［3，643＂；8，815．．． | ＝ORISFS2：SF\＄2000 | OR |  |
| （ Gustomer $^{\text {a }}$ | ［＂Amazon＂；＂Fr．．． | ＝ORISDS2：SDS2000 | OR |  |
| 可 Date | ［10／7／13＊；8／3．．． | ＝ORISAS2：SAS2000 | OR |  |
| © Product | ［＂AIM Item＂；－D．．． | ＝OR！SES2：SES2000 | OR |  |
| （Gegion | ［＇West＊；＂Sout．．． | ＝ORISB\＄2：SB\＄2000 | OR |  |
| 国 Sales | ［6，279＂；＇9，428．．． | ＝ORISGS2：SG\＄2000 | OR |  |
| （ SalesRep $^{\text {c }}$ | \｛＂Gigi＂；＂Gigi＂；＂．． | ＝ORISCS2：SCS2000 | OR |  |
| © COGS | \｛3，643＂； $8,815 \ldots$ | ＝AND！SFS2：SF\＄2000 | Workbook |  |
| 国 Customer | ［＂Amazon＂；＂Fr．．． | ＝AND！SDS2：SD\＄2000 | Workbook |  |
| © Date | ［10／7／13＂；＇8／3．．． | ＝AND！SAS2：SAS2000 | Workbook |  |
| E Product | ［＊AIM Item＂；${ }^{\text {d }}$ ．．． | ＝AND！SE\＄2：\＄E\＄2000 | Workbook |  |
| （E）Region | ［＇West＂，＂Sout．．． | ＝AND！SBS2：SBS2000 | Workbook |  |
| © Sales | ［6，279＂；＇9，428．．． | ＝AND！SG\＄2：SG\＄2000 | Workbook |  |
| SalesRep | ［＂Gigi＇；＂Gigi＇；＇．． | ＝AND！SCS2：SC\＄2000 | Workbook |  |
| 1 －III |  |  |  | ， |
| Refers to： |  |  |  |  |
| $\checkmark$ OR！SFS2：SF\＄2000 |  |  |  |  |
|  |  |  |  | Close |

## Cumulative List of Keyboards Throughout Class:

1) Esc Key:
i. Closes Backstage View (like Print Preview).
ii. Closes most dialog boxes.
iii. If you are in Edit mode in a Cell, Esc will revert back to what you had in the cell before you put the Cell in Edit mode.
2) F2 Key = Puts formula in Edit Mode and shows the rainbow colored Range Finder.
3) SUM Function: Alt + =
4) Ctrl + Shift + Arrow = Highlight column (Current Region).
5) Ctrl + Backspace = Jumps back to Active Cell
6) $\mathbf{C t r l}+Z=$ Undo.
7) $\mathbf{C t r l}+\mathbf{Y}=$ Undo the Undo.
8) $\mathrm{Ctrl}+\mathrm{C}=$ Copy.
9) $\mathbf{C t r l}+X=$ Cut.
10) Ctrl + V = Paste.
11) Ctrl + PageDown =expose next sheet to right.
12) Ctrl + PageUp =expose next sheet to left.
13) Ctrl + $\mathbf{1}$ = Format Cells dialog box, or in a chart it opens Format Chart Element Task Pane.
14) Ctrl + Arrow: jumps to the bottom of the "Current Region", which means it jumps to the last cell that has data, right before the first empty cell.
15) Ctrl + Home = Go to Cell A1.
16) Ctrl + End = Go to last cell used.
17) Alt keyboards are keys that you hit in succession. Alt keyboards are keyboards you can teach yourself by hitting the Alt key and looking at the screen tips.
i. Create PivotTable dialog box: Alt, N, V
ii. Page Setup dialog box: Alt, P, S, P
iii. Keyboard to open Sort dialog box: Alt, D, S
18) ENTER $=$ When you are in Edit Mode in a Cell, it will put thing in cell and move selected cell DOWN.
19) CTRL + ENTER = When you are in Edit Mode in a Cell, it will put thing in cell and keep cell selected.
20) TAB = When you are in Edit Mode in a Cell, it will put thing in cell and move selected cell RIGHT.
21) SHIFT + ENTER = When you are in Edit Mode in a Cell, it will put thing in cell and move selected cell UP.
22) SHIFT + TAB = When you are in Edit Mode in a Cell, it will put thing in cell and move selected cell LEFT.
23) Ctrl + T = Create Excel Table (with dynamic ranges) from a Proper Data Set.
i. Keyboard to name Excel Table: Alt, J, T, A
ii. $\quad$ Tab $=$ Enter Raw Data into an Excel Table.
24) Ctrl + Shift + ~ ( `) = General Number Formatting Keyboard.
25) Ctrl + ; = Keyboard for hardcoding today's date.
26) Ctrl + Shift + ; = Keyboard for hardcoding current time.
27) Arrow Key = If you are making a formula, Arrow key will "hunt" for Cell Reference.
28) Ctrl + B = Bold the Font
29) Ctrl + * (on Number Pad) or Ctrl + Shift +8 = Highlight Current Table.
30) Alt + Enter = Add Manual Line Break (Word Wrap)
31) $\mathbf{C t r l}+\mathbf{P}=$ Print dialog Backstage View and Print Preview
32) $\mathbf{F 4}$ Key = If you are in Edit mode while making a formula AND your cursor is touching a particular Cell Reference, F4 key will toggle through the different Cell References:
i. $\quad \mathbf{A 1}=$ Relative
ii. $\mathbf{\$ A} \mathbf{\$ 1}=$ Absolute or "Locked"
iii. $\quad \mathbf{A} \boldsymbol{\$ 1}=$ Mixed with Row Locked (Relative as you copy across the columns AND Locked as you copy down the rows)
iv. $\mathbf{\$ A 1}=$ Mixed with Column Locked (Relative as you copy down the rows AND Locked as you across the columns)
33) Ctrl + Shift + $\mathbf{4}$ = Apply Currency Number Formatting
34) Tab key = When you are selecting a Function from the Function Drop-down list, you can select the function that is highlighted in blue by using the Tab key.
35) $\mathbf{F 9} \mathbf{K e y}=$ To evaluate just a single part of formula while you are in edit mode, highlight part of formula and hit the F9 key.
i. If you are creating an Array Constant in your formula: Hit F9.
ii. If you are evaluating the formula element just to see what that part of the formula looks like, REMEMBER: to Undo with Ctrl + Z.
36) Alt, E, A, A = Clear All (Content and Formatting)
37) Evaluate Formula One Step at a Time Keyboard: Alt, M, V
38) Keyboard to open Sort dialog box: Alt, D, S
39) Ctrl + Shift + L = Filter (or Alt, D, F, F) = Toggle key for Filter Drop-down Arrows
40) $\mathbf{C t r l}+\mathbf{N}=$ Open New File
41) $\mathbf{F 1 2}$ = Save As (Change File Name, Location, File Type)
42) Import Excel Table into Power Query Editor: Alt, A, P, T
43) Ctrl + 1 (When Chart element in selected): Open Task Pane for Chart Element
44) F4 Key = If you are in Edit mode while making a formula AND your cursor is touching a particular Cell Reference, F4 key will toggle through the different Cell References:
i. $\quad \mathbf{A 1}=$ Relative
ii. $\mathbf{\$ A \$ 1}=$ Absolute or "Locked"
iii. $\mathbf{A} \$ \mathbf{1}=$ Mixed with Row Locked (Relative as you copy across the columns AND Locked as you copy down the rows)
iv. $\mathbf{\$ A 1}=$ Mixed with Column Locked (Relative as you copy down the rows AND Locked as you across the columns)
45) Keyboard to open Scenario Manager = Alt, T, E
46) Ctrl + Tab = Toggle between Excel Workbook File Windows
47) Ctrl + Shift + F3 = Create Names From Selection
48) Ctrl + F3 = open Name Manager
49) F3 = Paste Name or List of Names
50) Alt + F4 = Close Active Window
51) Window Key + Up Arrow = Maximize Active Window
52) Ctrl + Shift + Enter = Keystroke to enter Array Formulas that: 1) have a function argument that requires it, or 2) whether or not you are entering the Resultant Array into multiple cells simultaneously.
53) Ctrl + / = Highlight current Array

## New In This Video:

54) 
