Government Finance Officers Association

Commonly Used Excel Functions

Supplement to "Excel for Budget Analysts"

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Introduction

Excel is a popular tool used in public finance offices. Using Excel functions, tools, and various shortcuts not only expedites the time it takes to perform analyses, but can also create outputs that are more dynamic and engaging to stakeholders. GFOA's Excel webinar, "Excel for Budget Analysts," provides a more detailed demonstration and application of pivot tables, graphs, debt calculations, and scenario analysis and this guide serves as a supplement to additional Excel features that can help users within the finance office.

GFOA compiled this list of functions and shortcuts with the assistance of member and instructors' feedback and staff research. While this guide does not offer a comprehensive list of **all** the features within Excel, it does include some of the ones commonly used by Excel users within the public finance office.

Formulas and Functions

It is important that we make a distinction regarding formulas and functions for the purposes of Excel.

- Formulas are mathematical equations used to perform calculations in an Excel worksheet or workbook.
- Functions are predefined formulas that perform calculations in an Excel worksheet or workbook.

Both need to be written in a specific way, which is called the syntax, in order to calculate properly. Both also need at least one argument, which on the most basic level identifies the values for which to perform the action.

- For formulas, the basic syntax is equal (=), function name (AVERAGE, in the example below), and argument.

$$=AVERAGE(A1:A20)$$

Equal sign	Function name	Argument
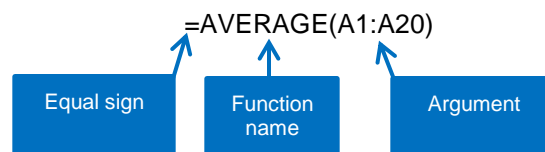
- For functions, the basic syntax is equal (=), function name (ROUND, in the example below), argument, and argument tooltip, which is an additional action to perform (2, in the example below represents 2 digits).

$$=ROUND(A1,2)$$

Equal sign	Function name	Argument	Argument
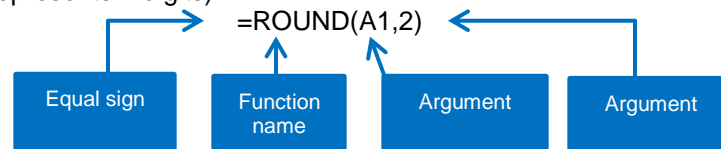
Excel offers hundreds of functions and categorizes them based on their functionality. This guide will cover only a small portion of the functions, including math and trigonometry, statistical, date and time, lookup and reference, text, and logical functions. To learn more about the various categories, please reference the Microsoft Office Support page on Excel functions (by category).

Math and Trigonometry Functions

Several math functions can help expedite analysis. This section highlights on a few.

ABS

When there is a need to get the absolute value of a number, the ABS function is helpful.

	A	B	C
1	Value	Formula	Results
2	-37	=ABS(A2)	37
3	-28	=ABS(A3)	28
4	-143	=ABS(A4)	143
5	56	=ABS(A5)	56
6	247	=ABS(A6)	247

ROUND, ROUNDUP, and ROUNDDOWN

There are various options with rounding, depending on the need. The functions' argument tooltip specifies how many decimal places or to which nearest integer it should round.

- ROUND – This function helps users to round to the nearest value.
- ROUNDDOWN – This function helps users to round values down to the nearest value based on the desired decimal place or integer.
- ROUNDUP - This function helps users to round values up to the nearest value based on the desired decimal place or integer.

	A	B	C
1	Unit Cost	Formula	Results
2	1.66666666666667	=ROUND(A2, 2)	1.67
3	1.66666666666667	=ROUNDDOWN(A3,1)	1.6
4	1.66666666666667	=ROUNDUP(A4,0)	2

Statistical Functions

When presented with large datasets, it is helpful to sort and summarize the information at hand.

COUNT, COUNTA, and COUNTBLANK

The counting functions are especially helpful with large datasets to identify anomalies and to get general summary statistics.

- COUNT – This function counts the number of cells that contain numbers.
- COUNTA – This function counts cells containing any type of information, including error values and empty text (as shown in the example below, it counts the cell marked "VOID").
- COUNTBLANK – This function counts only the empty cells within the dataset, with no information contained in the cells.

◢	A	B	C	D
1	PO #	Vendor	Invoice Amount	Payment Amount
2	0123	ABC Vendor	200	200
3	0124	DCF Vendor	343	343
4	0125	GHI Vendor	400	VOID
5	0126	JKL Vendor	841	84
6	0127	LMN Vendor	4237	
7	0128	OPQ Vendor	377	377
8	0129	RST Vendor	1029	1029
9	0130	UVW Vendor	875	
10	0131	XYZ Vendor	567	567
11				
12			Formula	Value
13		Total Number of Invoices Received	=COUNT(C2:C10)	9
14		Number of Invoices Paid	=COUNTA(D2:D10)	7
15		Number of Outstanding Invoices	=COUNTBLANK(D2:D10)	2

AVERAGE, MEDIAN, MIN, and MAX

With large datasets, it is often helpful to run basic summary statistics before doing further analysis.

- AVERAGE – This function calculates the average value in a dataset.
- MEDIAN – This function calculates the median, middle value, in a dataset.
- MIN – This function returns the lowest value in a dataset.
- MAX – This function returns the largest value in a dataset.

◢	A	B	C	D	E
1	Invoice Amount			Formula	Value
2	1195.32		Mean	=AVERAGE(A2:A21)	937.182
3	689.39		Median	=MEDIAN(A2:A21)	1000.71
4	1200		Minimum	=MIN(A2:A21)	576.29
5	1044.49		Maximum	=MAX(A2:A21)	1200
6	956.93				
7	1153.32				
8	817.49				
9	576.29				
10	1055.65				
11	682.94				

QUARTILE

The quartile function helps users to understand the distribution of values. The first argument identifies the values or cells that users want to calculate and the argument tooltip identifies which quartile (0 – minimum value; 1 – first quartile or 25th percentile; 2 – median value or 50th percentile; 3 – third quartile or 75th percentile; and 4 – maximum value).

	A	B	C	D	E
1	PO Amount			Formula	Value
2	690		Minimum Value	=QUARTILE(A2:A11,0)	583
3	1079		First Quartile	=QUARTILE(A2:A11,1)	662.25
4	1115		Second Quartile	=QUARTILE(A2:A11,2)	745.5
5	657		Third Quartile	=QUARTILE(A2:A11,3)	1055.25
6	1091		Maximum Value	=QUARTILE(A2:A11,4)	1115
7	678				
8	653				
9	984				
10	801				
11	583				

RAND and RANDBETWEEN

This function is helpful when needing to create random values. Note that the random values Excel generates will recalculate as the fields are altered.

- RAND – This function generates a random value between 0 and 1.
- RANDBETWEEN – This function generates a random value between a specified range of values.

	A	B	C
1		Formula	Value
2	Random number between 0 and 1	=RAND()	0.139364106184057
3	Random number between specified value, e.g., 1 and 10	=RANDBETWEEN(1,10)	2

Date and Time Functions

Sometimes when we export data from a database system, the date does not extract as neatly. Other times, we are looking to calculate the duration from one date to another.

DATE

This function is useful when information related to year, month, and date are in separate cells and the preference is to have the date in one cell.

	A	B	C	D	E	F
1	YEAR	MONTH	DATE		Formula	Value
2	2015	2	3		=DATE(A2,B2,C2)	2/3/2015
3	2015	3	14		=DATE(A3,B3,C3)	3/14/2015
4	2015	4	30		=DATE(A4,B4,C4)	4/30/2015

YEAR, MONTH, and DAY

These functions are helpful to capture the appropriate piece of information in a date cell.

	A	B	C	D	E
1	DATE			Formula	Value
2	2/3/2015		Year	=YEAR(A2)	2015
3			Month	=MONTH(A2)	2
4			Day	=DAY(A2)	3

WEEKDAY

This function returns the day of the week for a given date. The argument tooltip defines when the week starts, with 1 being the first day of a given weekday.

	A	B	C	D
1	DATE		Formula	Value
2	2/3/2015		=WEEKDAY(A2,1)	3
3	3/14/2015		=WEEKDAY(A3,1)	7
4	4/30/2015		=WEEKDAY(A4,1)	5
5	5/20/2015		=WEEKDAY(A5,1)	4
6	6/12/2015		=WEEKDAY(A6,1)	6
7	7/23/2015		=WEEKDAY(A7,17)	5

- 1 - Numbers 1 (Sunday) through 7 (Saturday)
- 2 - Numbers 1 (Monday) through 7 (Sunday)
- 3 - Numbers 0 (Monday) through 6 (Sunday)
- 11 - Numbers 1 (Monday) through 7 (Sunday)
- 12 - Numbers 1 (Tuesday) through 7 (Monday)
- 13 - Numbers 1 (Wednesday) through 7 (Tuesday)
- 14 - Numbers 1 (Thursday) through 7 (Wednesday)
- 15 - Numbers 1 (Friday) through 7 (Thursday)
- 16 - Numbers 1 (Saturday) through 7 (Friday)
- 17 - Numbers 1 (Sunday) through 7 (Saturday)

DATEDIF

This function calculates the interval between two dates. The second argument specifies the type of interval, e.g., day, month, year, etc.

	A	B	C	D	E
1	DATE			Formula	Value
2	2/3/2015		Days	=DATEDIF(A2,A3,"D")	365
3	2/3/2016		Month	=DATEDIF(A2,A3,"M")	12
4			Year	=DATEDIF(A2,A3,"Y")	1

Lookup and Reference Functions

Sometimes we need to identify and search for a particular value in our dataset. This is when lookup and reference functions are helpful.

VLOOKUP

This function returns a value based on reference information presented in a vertical layout. In the example below, Columns A and B represent reference information. Columns D through F represent data we want to review. In Column H, we are telling Excel to use the value in E2 to find the value for H2 by looking at the information in Columns A and B.

The first argument tooltip in our example is a "2." This represents the Column B. We have information on the revenue code (Column E) and want to return information on the revenue name (Column B).

The second argument tooltip is for Excel to identify the appropriateness of the match. "False" denotes an exact match, while "True" denotes an appropriate match. We want an exact match for this scenario.

	Revenue Code	Revenue Name		DATE	CODE	AMOUNT		Formula	Value
1	Revenue Code	Revenue Name		DATE	CODE	AMOUNT		Formula	Value
2	100	Sales Tax		2/3/2015	130	4,313.93		=VLOOKUP(E2,A:B,2,FALSE)	Telecommunications Tax
3	110	Property Tax		2/3/2015	100	53,902.13		=VLOOKUP(E3,A:B,2,FALSE)	Sales Tax
4	120	Business License Fee		2/10/2015	120	43,294.10		=VLOOKUP(E4,A:B,2,FALSE)	Business License Fee
5	130	Telecommunications Tax		2/11/2015	100	32,094.20		=VLOOKUP(E5,A:B,2,FALSE)	Sales Tax
6				2/11/2015	130	3,823.26		=VLOOKUP(E6,A:B,2,FALSE)	Telecommunications Tax
7				2/13/2015	110	29,842.50		=VLOOKUP(E7,A:B,2,FALSE)	Property Tax

HLOOKUP

This function returns a value based on reference information presented in a horizontal layout. Using the examples used for VLOOKUP, the reference data is presented in a different format. The reference information is contained in A1:E2. In H4, we are instructing Excel to use the value in H2 to find the value for H4 by looking at the information in A1:E2. (Note: Dollar signs ($) before a cell letter and number makes it stationary to prevent Excel from shifting the reference when we drag or copy the formula across.)

The first argument tooltip in our example is a "2." This represents the Row 2. We have information on the revenue code (Row 1) and want to return information on revenue name (Row 2).

The second argument tooltip is for Excel to identify the appropriateness of the match. "False" denotes an exact match, while "True" denotes an appropriate match. We want an exact match for this scenario.

	A	B	C	D	E	F	G	H	I	J
1	Revenue Code	100	110	120	130		DATE	2/3/2015	2/3/2015	2/10/2015
2	Revenue Name	Sales Tax	Property Tax	Business License Fee	Telecom Tax		CODE	130	100	120
3							AMOUNT	4,313.93	53,902.13	43,294.10
4							Formula	=HLOOKUP(H2,$A$1:$E$2,2,FALSE)	=HLOOKUP(I2,$A$1:$E$2,2,FALSE)	=HLOOKUP(J2,$A$1:$E$2,2,FALSE)
5							Value	Telecom Tax	Sales Tax	Business License Fee

TRANSPOSE

This function is helpful when switching column and row headings in a table. In the example below, the months are row headings and we need to adjust them to become column headings. To transpose the month values into column headings, we select the cells where we want the new heading (B10:G10 in the example below). Then, we enter the function and identify the cells that contain the information desired (A3:A8). To run this function, click Ctrl + Shift + Enter to return values.

	A	B	C	D	E	F	G
1	Voucher Total (Jan-Jun 2015)						
2		Dept_01	Dept_02	Dept_03	Dept_04	Dept_05	
3	January	9230.03	6434.4	4854.43	234501.2	546345.54	
4	February	5652.43	4930.34	4820.4	475242.34	435903.3	
5	March	4304.5	6745.3	56105.34	54234.5	889043.34	
6	April	7963.43	79354.52	7804.34	76843.45	673434.52	
7	May	7529.23	563094.53	20394.23	55432.34	427934.31	
8	June	6498.32	679844.34	76987.32	797923.34	549784.79	
9							
10	Formula	=TRANSPOSE(A3:A8)	=TRANSPOSE(A3:A8)	=TRANSPOSE(A3:A8)	=TRANSPOSE(A3:A8)	=TRANSPOSE(A3:A8)	=TRANSPOSE(A3:A8)
11	Values	January	February	March	April	May	June

Another way to perform transpose is to copy, paste special, and identify the transpose option.

INDEX

This function can take two forms. The first form is a reference where users instruct Excel to return values in a table based on headings. The argument first identifies the values in the table (B3:F8 in the example below). The first argument tooltip identifies the row number within the table of inquiry (4 for April and 5 for May, respectively) and the third tooltip identifies the column within the table of inquiry (1 for Dept_01 and 2 for Dept_02).

	A	B	C	D	E	F
1		Voucher Total (Jan-Jun 2015)				
2		Dept_01	Dept_02	Dept_03	Dept_04	Dept_05
3	January	9230.03	6434.4	4854.43	234501.2	546345.54
4	February	5652.43	4930.34	4820.4	475242.34	435903.3
5	March	4304.5	6745.3	56105.34	54234.5	889043.34
6	April	7963.43	79354.52	7804.34	76843.45	673434.52
7	May	7529.23	563094.53	20394.23	55432.34	427934.31
8	June	6498.32	679844.34	76987.32	797923.34	549784.79
9						
10		Formula	Value			
11	Dept_01 in April	=INDEX(B3:F8,4,1)	7963.43			
12	Dept_02 in May	=INDEX(B3:F8,5,2)	563094.53			

The array form returns the entire row or column of table. Note, it is important to first select the cells you want to contain the returned values (in the example below, B11:F11 were selected as the formula was entered). The argument first identifies the values in the table (B3:F8). The first tooltip identifies the row of inquiry (3 for March). The following argument tooltip references the column from the reference to which Excel should return (0 for no columns). Note to run the function in array form for a selected group of cells, click Ctrl + Shift + Enter to return values and not Enter.

	A	B	C	D	E	F
1		Voucher Total (Jan-Jun 2015)				
2		Dept_01	Dept_02	Dept_03	Dept_04	Dept_05
3	January	9230.03	6434.4	4854.43	234501.2	546345.54
4	February	5652.43	4930.34	4820.4	475242.34	435903.3
5	March	4304.5	6745.3	56105.34	54234.5	889043.34
6	April	7963.43	79354.52	7804.34	76843.45	673434.52
7	May	7529.23	563094.53	20394.23	55432.34	427934.31
8	June	6498.32	679844.34	76987.32	797923.34	549784.79
9						
10			March 2015 Values			
11	Formula	=INDEX(B3:F8,3,0)	=INDEX(C3:G8,3,0)	=INDEX(D3:H8,3,0)	=INDEX(E3:I8,3,0)	=INDEX(F3:J8,3,0)
12	Values	4304.5	6745.3	56105.34	54234.5	889043.34

MATCH

This function shows users where in a list they can find their values by providing Excel with search parameters.

The example below is identifying where the break is in the list for those earning less than $5,000. The argument first identifies the search value (5,000 in the example below). The first tooltip identifies the column or row of inquiry. In this example, the first tooltip identifies the cells with the salary information (D2:D16). The second tooltip identifies whether an exact (0) or approximate match (1 or -1) is desired. In this example, 1 is used to denote less than $5,000.

Please note that if the inquiry is for less than the search value (1), then the column or row needs to be sorted in ascending order. Conversely, if the inquiry is for greater than the search value (-1), then the column or row needs to be sorted in descending order before proceeding with the match function. Note that the salary column in the example is sorted in ascending order.

The return information is 7 to identify the position in the cell range (D2:D16) that contains the information, e.g., the split in the list of those earning less than $5,000.

	A	B	C	D	E	F	G
1	LAST_NAME	FIRST_NAME	DEPT_CODE	SALARY		Formula	Position
2	Scott	Allen	03	2303.78		=MATCH(5000,D2:D16,1)	7
3	Darwin	Peter	02	2432.23			
4	Tyler	Ashley	04	3245.23			
5	Randall	Alfred	05	3523.87			
6	Donaldson	Michael	01	4000.33			
7	Evertt	Judith	01	4094.34			
8	Thomas	Amanada	04	4523.23			
9	Richardson	Catherine	02	5023.12			
10	Franklin	James	03	5432.87			
11	Jacobson	Cheryl	04	5632.38			
12	Jordan	Zachary	05	5642.1			
13	Smith	John	01	6303.23			
14	Thompson	Eric	03	6323.1			
15	Pike	Jessica	05	7632.31			
16	Nicholas	Joan	02	8272.12			

GETPIVOTDATA

To avoid copying and pasting information from a pivot table, this function helps to return values using appropriate commands. The example below shows the level of details that can be captured using this function. In the first example, we are identifying the grand total of revenues from the pivot table. To do so, the first argument is the data field of inquiry where the data we want is contained, e.g. "Sum of Revenues ($000). The first tooltip is the reference cell in the PivotTable to help determine which report to Excel should pull from (this is especially useful when you are entering this function in one worksheet and have multiple PivotTable reports in the workbook.)

The second example builds off of the first, but wants to identify the total for February. This requires additional tooltips on the field name (Month), which is field heading in original dataset, and the actual item name (February).

The third example is more specific than the second and contains additional tooltips to identify sales tax revenues in March. Other tooltips for field name (Source) and item (Sales Tax) is included.

	A	B	C	D	E	F	G	H	I
1									
2									
3	Sum of Revenues ($000)	Column Labels						Formula	Value
4	Row Labels	Jan	Feb	Mar	Grand Total		Total Revenues	=GETPIVOTDATA("Sum of Revenues ($000)", A3)	545652
5	Business License Fee	$10,032.00	$131,547.00	$77,598.00	$219,177.00		Total Revenues for Feb	=GETPIVOTDATA("Sum of Revenues ($000)", A3, "Month", "February")	318149
6	Property Tax	$8,663.00	$76,374.00	$51,079.00	$136,116.00		Total Sales Tax Revenues for Feb	=GETPIVOTDATA("Sum of Revenues ($000)", A3, "Month", "February", "Source", "Sales Tax")	51160
7	Sales Tax	$4,849.00	$51,160.00	$31,533.00	$87,542.00				
8	Telecommunications Fee	$5,197.00	$59,068.00	$38,552.00	$102,817.00				
9	Grand Total	$28,741.00	$318,149.00	$198,762.00	$545,652.00				

Text Functions

Text functions are helpful when we seek to only get a portion of the information contained within a cell or we are trying to combine information contained in multiple cells.

LOWER, UPPER, and PROPER

Formatting can be an issue when exporting data. Information may be in upper cases, lower cases, or a combination of both. To make clean tables and charts can require formatting or use of the following functions:

- LOWER – This function returns text values in a cell in all lower case.
- UPPER – This function returns text values in a cell in all upper case.
- PROPER – This function returns text values in a cell with the each of the first word capitalized.

	A	B	C	D	E
1				Formula	Value
2	SALES TAX		Lower	=LOWER(A2)	sales tax
3	property tax		Upper	=UPPER(A3)	PROPERTY TAX
4	BUSINESS LICENSE AND PERMITS		Proper	=PROPER(A4)	Business License And Permits

CONCATENATE

CONCATENATE is helpful to combine information contained in separate cells into one cell. The function contains arguments referencing the cells containing the information.

The example below shows how the function returns values. In the first example, first name and last name is combined, but look closely because there isn't a space. By adding to the argument by including spaces (" "), commas (", "), and other desired punctuation or words (" of ") the appropriate desired value can be returned.

	A	B	C	D
1	LAST_NAME	FIRST_NAME	TITLE	DEPT
2	Smith	John	Finance Director	Finance
3				
4		Formula	Value	
5	First and Last Name	=CONCATENATE(B2, A2)	JohnSmith	
6	Name, Title, and Department	=CONCATENATE(B2," ", A2, ", ",C2," of ",D2)	John Smith, Finance Director of Finance	

LEFT, RIGHT, and MID

These functions are helpful to extract a portion of a larger string. The example below shows is an account structure. The first four digits represent the department/division. In order to retrieve the first four digits, we use the left function. The first argument identifies the cell containing the account information (A2) and the tooltip identifies how many digits from the left do we want to extract (4).

The RIGHT function follows a similar structure. In the example below, the last 5 digits represent the object. Thus, the argument identifies the cell containing the account information (A2) and the number of digits from the right we want to extract (5).

The MID function requires more details. Similar to LEFT and RIGHT, the argument identifies the cell containing the account information (A2). The first tooltip identifies which digit to start the extraction (5 to represent the fifth digit in the account string) and second tooltip identifies the number of digits to extract (5).

	A	B	C	D	E
1	Account Number			Formula	Value
2	10303000010300		Department/Division (first 4 digits)	=LEFT(A2,4)	1030
3			Program/Activity (middle 5 digits)	=MID(A2,5,5)	30000
4			Object (last 5 digits)	=RIGHT(A2,5)	10300

LEN and TRIM

LEN is helpful to return the length of a string in a cell. The function contains one argument and that is the cell of inquiry. Note from the example below that Excel calculates extra spaces in the string in the length number. For example, the name Eli is shown as having a length of 5 and Tina has a length of 6.

	A	B	C	D
1	FIRST_NAME		Formula	Length
2	Ashley		=LEN(A2)	6
3	Eli		=LEN(A3)	5
4	Jordan		=LEN(A4)	7
5	Taylor		=LEN(A5)	6
6	Brandon		=LEN(A6)	7
7	Tina		=LEN(A7)	6
8	Oscar		=LEN(A8)	5
9	Darren		=LEN(A9)	6
10	Jessica		=LEN(A10)	7
11	Susan		=LEN(A11)	5

One common use of the TRIM function is to remove extra spacing. Following the example above, the TRIM function is used below to remove the extra spacing, which shortens the length of the cell. The function contains one argument and that is the cell of inquiry.

	A	B	C	D	E	F
1	FIRST_NAME	Original Length		Formula	Value	New Length
2	Eli	5		=TRIM(A2)	Eli	3
3	Tina	6		=TRIM(A3)	Tina	4

TEXT and VALUE

When exporting data, numbers can sometimes appear with formatting issues or come in as text rather than number.

TEXT converts a numeric value to text. There are also different ways users can specify the display formatting by using special format strings. The first example below shows a figure with many decimals, but we want only the whole number. Thus, the TEXT function is used to identify the cell that contains the information (A2) and specifies it should be the nearest whole number ("0"). In the second example, the figure is 21.3, but we want it to display as a dollar value. Using the TEXT function, A3 is identified as the cell that contains the information and "$0.00" is specified as the display.

	A	B	C	D
1			Formula	Value
2	102.328921		=TEXT(A2,"0")	102
3		21.3	=TEXT(A3,"$0.00")	$21.30
4	46897		=VALUE(A4)	46897

Above in A4 contains a number, but Excel recognizes it as text (a simple way to determine that Excel has identified this as text is the green triangle on the upper left corner). If the figures are recognized as text instead of numbers, then calculation and analysis cannot be performed accurately. The VALUE function contains one argument, which identifies the cell that contains the information (A4).

Logical Functions

Logical functions are useful when we are seeking to perform conditional actions or calculations.

COUNTIF

This function counts the number of cells that meet a criterion. The two examples below show how COUNTIF operates. The argument is the range of cells that we want Excel to review. The tooltip specifies the criterion, e.g. code 100 and vendor ABC, respectively.

	A	B	C	D	E	F	G	H
1	VENDOR	DATE	CODE	AMOUNT			Formula	Value
2	ABC	2/3/2015	130	$4,313.93		Number of Code 100	=COUNTIF(C2:C7,"100")	3
3	ABC	2/3/2015	100	$53,902.13		Number of Vendor ABC	=COUNTIF(A2:A7,"ABC")	3
4	DEF	2/10/2015	120	$43,294.10				
5	XYZ	2/11/2015	100	$32,094.20				
6	DEF	2/11/2015	130	$3,823.26				
7	ABC	2/13/2015	100	$29,842.50				

SUMIF

This function sums the values in a range that meet criteria specified. The two examples below show how SUMIF operates. The first part of the argument is the range of cells we want evaluated based on our criteria. The first tooltip is the criteria itself, e.g. code 100 and vendor ABC, respectively. The following tooltip is the range of cells for Excel to perform the summarization function, e.g., amount in both instances.

	A	B	C	D	E	F	G	H
1	VENDOR	DATE	CODE	AMOUNT			Formula	Value
2	ABC	2/3/2015	130	$4,313.93		Total for Code 100	=SUMIF(C2:C7,"100",D2:D7)	$115,838.83
3	ABC	2/3/2015	100	$53,902.13		Total for Vendor ABC	=SUMIF(A2:A7, "ABC",D2:D7)	$88,058.56
4	DEF	2/10/2015	120	$43,294.10				
5	XYZ	2/11/2015	100	$32,094.20				
6	DEF	2/11/2015	130	$3,823.26				
7	ABC	2/13/2015	100	$29,842.50				

IF

If statements are helpful to return one value if the statement is true and another if the statement is false. In the example below, we are comparing the payment amount (C2:C7) to the invoice amount (B2:B7). If the payment amount is greater than the invoice amount, then Excel returns a value of "Overpayment." If the payment amount is **not** less than the invoice amount, then Excel

return a value of "Not Overpayment." Please note the attention to the value we selected to return if the statement is false because the logic statement is also capturing instances where the payment amount equals the invoice amount (Rows 3 and 6).

	A	B	C	D	E	F
1	VENDOR	INVOICE_AMOUNT	PAYMENT_AMOUNT		Formula	Value
2	ABC	$4,313.93	$4,311.93		=IF(C2>B2, "Overpayment", "Not Overpayment")	Not Overpayment
3	ABC	$53,902.13	$53,902.13		=IF(C3>B3, "Overpayment", "Not Overpayment")	Not Overpayment
4	DEF	$43,294.10	$43,317.20		=IF(C4>B4, "Overpayment", "Not Overpayment")	Overpayment
5	XYZ	$32,094.20	$28,884.78		=IF(C5>B5, "Overpayment", "Not Overpayment")	Not Overpayment
6	DEF	$3,823.26	$3,823.26		=IF(C6>B6, "Overpayment", "Not Overpayment")	Not Overpayment
7	ABC	$29,842.50	$29,847.50		=IF(C7>B7, "Overpayment", "Not Overpayment")	Overpayment

AND

Similar to if statements, the AND function returns a value of "TRUE" if the statement is true and "FALSE" if the statement is false. The function tests multiple criteria. In the example below, the statement is testing two criteria. The first is whether there has been an underpayment (Column E is less than Column C) and whether the payment took more than 30 days from time of invoice (Column D minus Column B is greater than 30). Both conditions must be true in order for Excel to return the value "TRUE." If only one of the conditions is true, either there is an underpayment or payment took over 30 days from time of invoice, then Excel returns the value "FALSE."

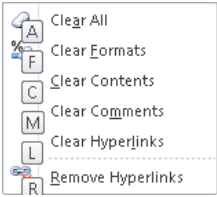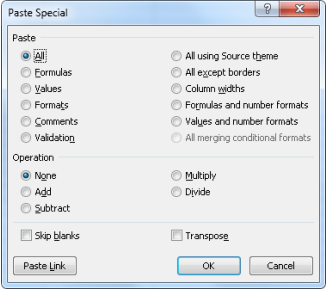|	A	B	C	D	E	F	G	H
1	VENDOR	INVOICE_DATE	INVOICE_AMOUNT	PAYMENT_DATE	PAYMENT_AMOUNT		Formula	Value
2	ABC	12/13/2015	$4,313.93	2/11/2016	$4,098.23		=AND(E2<C2,(D2-B2>30))	TRUE
3	ABC	12/8/2015	$53,902.13	12/28/2015	$53,902.13		=AND(E3<C3,(D3-B3>30))	FALSE
4	DEF	12/3/2015	$43,294.10	1/7/2016	$43,294.10		=AND(E4<C4,(D4-B4>30))	FALSE
5	XYZ	12/4/2015	$32,094.20	12/14/2015	$32,094.20		=AND(E5<C5,(D5-B5>30))	FALSE
6	DEF	12/11/2015	$53,823.26	1/12/2016	$53,623.38		=AND(E6<C6,(D6-B6>30))	TRUE
7	ABC	12/10/2015	$29,842.50	1/11/2016	$29,842.50		=AND(E7<C7,(D7-B7>30))	FALSE

OR

This function tests multiple logic criteria and returns a value of "TRUE" if one criterion is true. The example below is similar to the one for the AND function. However, if one of the conditions, e.g., underpayment (Column E is less than Column C) or payment taking more than 30 days from time of invoice (Column D minus Column B is greater than 30), is met, then Excel returns the value "TRUE." If both conditions are not met, then Excel returns the value "FALSE."

	A	B	C	D	E	F	G	H
1	VENDOR	INVOICE_DATE	INVOICE_AMOUNT	PAYMENT_DATE	PAYMENT_AMOUNT		Formula	Value
2	ABC	12/13/2015	$4,313.93	2/11/2016	$4,098.23		=OR(E2<C2,(D2-B2>30))	TRUE
3	ABC	12/8/2015	$53,902.13	12/28/2015	$53,902.13		=OR(E3<C3,(D3-B3>30))	FALSE
4	DEF	12/3/2015	$43,294.10	1/7/2016	$43,294.10		=OR(E4<C4,(D4-B4>30))	TRUE
5	XYZ	12/4/2015	$32,094.20	12/14/2015	$32,094.20		=OR(E5<C5,(D5-B5>30))	FALSE
6	DEF	12/11/2015	$53,823.26	1/12/2016	$53,623.38		=OR(E6<C6,(D6-B6>30))	TRUE
7	ABC	12/10/2015	$29,842.50	1/11/2016	$29,842.50		=OR(E7<C7,(D7-B7>30))	TRUE

Shortcuts

Formatting

Shortcut Name	Keystrokes	Purpose
Border	Ctrl+Shift+7	Places border around selected cell(s)
Remove Border	Ctrl+Shift+–	Removes border around selected cell(s)
Clear	Alt+H+E	Opens clear editing features. Keying additional letters will perform the functions listed below:
Paste Special	Ctrl+C, Alt+H+V	Opens paste special features Keying additional letters as indicated in the underlined word performs the functions listed below:
Change Font Size	Alt+H+F+S	Goes to font size dropdown
Format Cell	Ctrl+1	Opens format cell window
Group rows or columns	Alt+A+G+G or Shift+Alt+→	Opens group window
Ungroup rows or columns	Alt+A+U+U or Shift+Alt+←	Ungroups grouped rows or columns
Highlight Row	Shift+Spacebar	Selects entire row

Editing

Shortcut Name	Keystrokes	Purpose
Replace	Ctrl+H	Opens Find and Replace Window
Redo	Ctrl+Y	Redos last edit
Undo	Ctrl+Z	Undos last edit

Calculations

Shortcut Name	Keystrokes	Purpose
Auto Sum	Alt+=	Summarizes column or row information
Edit Cell	F2	Edits formula or function

Naming

Shortcut Name	Keystrokes	Purpose
Name Cell	Ctrl+F3	Opens Name Manager window
Rename Worksheet	Alt+H+O+R	Renames worksheet

Navigation

Shortcut Name	Keystrokes	Purpose
Go To	F5 or Ctrl+G	Opens Go To window to go to a different cell
Go To End of Continuous Range	Ctrl+↓	Goes to last cell in the range
Select to End of Continuous Range	Ctrl+Shift+↓	Selects cells to the end of range
Highlight Column	Ctrl+Spacebar	Selects entire column
Toggle Workbooks	Ctrl+Tab	Navigate between open workbooks
Move Between Worksheets	Ctrl+Page Up, Ctrl+Page Down	Page Up moves to workpages to the right and Page Down moves to workpages to the left

Reference

Shortcut Name	Keystrokes	Purpose
Anchoring Cells	F4	Locks reference cells
Trace Precedents	Alt+M+P	Identifies cells that are used to calculate a given formula using arrows
Trace Dependents	Alt+M+D	Identifies cells where a formula contain information on a given cell using arrows
Remove Trace Arrows	Alt+M+A+A	Removes arrows from trace precedent and trace dependent features