

Excel Module 2

Working with Formulas and Functions





Module Objectives

- Create a complex formula
- Insert a function
- Type a function
- Copy and move cell entries
- Understand relative and absolute cell references
- Copy formulas with relative cell references
- Copy formulas with absolute cell references
- Round a value with a function



Create a Complex Formula (Slide 1 of 2)

- A **complex formula** is an equation that uses more than one type of arithmetic operator
 - Example: formula that uses both addition and multiplication
- Arithmetic operations are performed according to the **order of precedence**
 - Operations inside parentheses are calculated first
 - Exponents are calculated next
 - Multiplication and division are calculated next (from left to right)
 - Addition and subtraction are calculated next (from left to right)



Create a Complex Formula (Slide 2 of 2)

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Your Name Share

Clipboard Font Alignment Number Styles Cells Editing

C14 $=C12+C12*0.2$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Tour Expenses by Quarter, FY 2017															
2																
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total										
4	Australia	6076.2	6173.82	7207.66	6624.19											
5	Brazil	3610.99	4021.46	4437.4	4658.11											
6	Britain	4387.78	4471.98	4670.21	4200.04											
7	France	4132.1	4589.74	4679.06	4793.72											
8	Germany	5182.77	3094.56	3661.12	3812.5											
9	India	1568.25	2610.3	2765.04	2990.95											
10	Malaysia	3371.5	3665.14	8340.35	3821.89											
11	U.S.A.	7295.06	6642.76	8340.46	7118.91											
12	Total	35624.65	35269.76	44101.3	38020.31											
13																
14	20% rise	42749.58	42323.712	52921.56	45624.372											
15	Average															
16	Maximum															
17	Minimum															
18																
19																
20																
21																

Complex formula
 $=C12+C12*0.2$

Ready Average: 46956.548 Count: 3 Sum: 140869.644 120%



Insert a Function (Slide 1 of 2)

- A **function** is a predefined worksheet formula that makes it easy to perform a complex calculation
 - Can be used by itself or within a formula
 - If used alone, begins with the formula prefix (=)
 - Functions are organized into categories (such as Financial, Date & Time, Statistical)



Insert a Function (Slide 2 of 2)

Expanded Function Arguments dialog box

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Your Name Share

Clipboard Font Alignment Number Styles Cells Editing

B15 X ✓ fx =AVERAGE(B4:B11)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Tour Expenses by Quarter, FY 2017															
2																
3		Quarter 1	Quarter 2	Quarter 3												
4	Australia	6076.2	6173.82	7207.66												
5	Brazil	3610.99	4021.46	4437.4												
6	Britain	4387.78	4471.98	4670.21												
7	France	4132.1	4589.74	4679.06												
8	Germany	5182.77	3094.56	3661.12												
9	India	1568.25	2610.3	2765.04												
10	Malaysia	3371.5	3665.14	8340.35												
11	U.S.A.	7295.06	6642.76	8340.46												
12	Total	35624.65	35269.76	44101.3												
13																
14	20% rise	42749.58	42323.712	52921.56												
15	Average	:(B4:B11)														

Function Arguments

AVERAGE

Number1: B4:B11 = (6076.2;3610.99;4387.78;4132.1;5182.77;3094.56;1568.25;3371.5;7295.06;6642.76;8340.46)

Number2: = number

= 4453.08125

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 4453.08125

[Help on this function](#)

OK Cancel



Type a Function (Slide 1 of 2)

- A function can be typed manually into a cell
 - Must know the name and initial characters of the function
 - Can be faster than using the Insert Function dialog box
 - Experienced Excel users often prefer this method
- Necessary to begin with the equal sign (=) when typed manually
- Once you type an equal sign, each letter you type activates the AutoComplete feature



Type a Function (Slide 2 of 2)

MAX function in progress

13					
14	20% rise	42749.58	42323.712	52921.56	45624.372
15	Average	4453.0813	4408.72	5512.6625	4752.5388
16	Maximum	=MAX(
17	Minimum	MAX(number1, [number2], ...)			

ScreenTip



Copy and Move Cell Entries (Slide 1 of 2)

- You can copy or move data within a worksheet or between worksheets using:
 - Cut, Copy, and Paste buttons
 - Fill handle in the lower-right corner of the active cell
 - Drag-and-drop feature
- **Clipboard** temporarily stores information that you copy or cut
- Pasting an item from the Clipboard
 - Only need to specify the upper-left cell of the range where you want to paste the selection



Copy and Move Cell Entries (Slide 2 of 2)

Copied data in Office Clipboard

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do...

Clipboard Font Alignment Number Styles Cells Editing

Clipboard

Paste All Clear All

Click an item to Paste:

- Quarter 1
- Quarter 2
- Quarter 3
- Quarter 4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Tour Expenses by Quarter, FY 2017													
2														
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total								
4	Australia	6076.2	6173.82	7207.66	6624.19									
5	Brazil	3610.99	4021.46	4437.4	4658.11									
6	Britain	4387.78	4471.98	4670.21	4200.04									
7	France	4132.1	4589.74	4679.06	4793.72									
8	Germany	5182.77	3094.56	3661.12	3812.5									
9	India	1568.25	2610.3	2765.04	2990.95									
10	Malaysia	3371.5	3665.14	8340.35	3821.89									
11	U.S.A.	7295.06	6642.76	8340.46	7118.91									
12	Total	35624.65	35269.76	44101.3	38020.31									
13														
14	20% rise	42749.58	42323.712	52921.56	45624.372									
15	Average	4453.0813	4408.72	5512.6625	4752.5388									
16	Maximum	7295.06	6642.76	8340.46	7118.91									
17	Minimum	1568.25	2610.3	2765.04	2990.95									
18														



Understand Relative and Absolute Cell References (Slide 1 of 4)

- Use a **relative cell reference** when you want to preserve the relationship to the formula location
 - Calculations are performed based on cell relationship
 - When a formula is copied, the cell reference changes to preserve the relationship of the formula to the referenced cells
 - Default in Excel
- Use an **absolute cell reference** when you want to preserve the exact cell address in a formula
 - Reference does not change even if the formula is copied to another location
 - Created by placing a dollar sign (\$) before both the column letter and the row number for the cell's address



Understand Relative and Absolute Cell References (Slide 2 of 4)

- **Mixed reference** combines both relative and absolute cell referencing
 - Example: When you copy a formula, you may want to change the row reference but keep the column reference
 - Created using the [F4] function key



Understand Relative and Absolute Cell References (Slide 3 of 4)

Formula containing relative references

Expense Projections.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do...

Clipboard Font Alignment Number Styles Cells Editing

Formula Bar: F5 =SUM(B5:E5)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1			Reason2Go Travel Sales																	
2			Expense Projections for 2017																	
3																				
4			Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total													
5	Australia	5,800	6,000	6,200	6,400	\$ 24,400														
6	Brazil	4,000	5,000	4,800	4,800	\$ 18,600														
7	Britain	4,900	4,600	4,900	4,800	\$ 19,200														
8	France	4,500	4,800	4,900	4,900	\$ 19,100														
9	Germany	3,300	3,300	3,900	400	\$ 10,900														
10	India	1,900	2,800	2,900	3,200	\$ 10,800														
11	Malaysia	3,600	3,900	3,900	3,600	\$ 15,000														
12	U.S.A.	7,500	6,900	9,200	7,500	\$ 31,100														
13	Total	\$ 35,500	\$ 37,300	\$ 40,700	\$ 35,600	\$ 113,500														
14																				
15	potential																			
16	increase	1.5																		
17																				
18			Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total													
19	Australia	8,700	9,000	9,300	9,600	\$ 36,600														
20	Brazil	6,000	7,500	7,200	7,200	\$ 27,900														
21	Britain	7,350	6,900	7,350	7,200	\$ 28,800														
22	France	6,750	7,200	7,350	7,350	\$ 28,650														
23	Germany	4,950	4,950	5,850	600	\$ 16,350														
24	India	2,850	4,200	4,350	4,800	\$ 16,200														
25	Malaysia	5,400	5,850	5,850	5,400	\$ 22,500														
26	U.S.A.	11,250	10,350	13,800	11,250	\$ 46,650														
27	Total	\$ 53,250	\$ 55,950	\$ 61,050	\$ 53,400	\$ 223,650														
28																				
29																				
30																				



Understand Relative and Absolute Cell References (Slide 4 of 4)

Formula containing absolute and relative references

Expense Projections.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do...

Clipboard Font Alignment Number Styles Cells Editing

Formula Bar: F5 =SUM(B5:E5)

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total			
5	Australia	5800	6000	6200	6400	=SUM(B5:E5)			
6	Brazil	4000	5000	4800	4800	=SUM(B6:E6)			
7	Britain	4900	4600	4900	4800	=SUM(B7:E7)			
8	France	4500	4800	4900	4900	=SUM(B8:E8)			
9	Germany	3300	3300	3900	400	=SUM(B9:E9)			
10	India	1900	2800	2900	3200	=SUM(B10:E10)			
11	Malaysia	3600	3900	3900	3600	=SUM(B11:E11)			
12	U.S.A.	7500	6900	9200	7500	=SUM(B12:E12)			
13	Total	=SUM(B5:B12)	=SUM(C5:C12)	=SUM(D5:D12)	=SUM(E5:E12)	=SUM(B13:D13)			
14									
15	potential								
16	increase	1.5							
17									
18		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total			
19	Australia	=B5*\$B\$16	=C5*\$B\$16	=D5*\$B\$16	=E5*\$B\$16	=SUM(B19:E19)			
20	Brazil	=B6*\$B\$16	=C6*\$B\$16	=D6*\$B\$16	=E6*\$B\$16	=SUM(B20:E20)			
21	Britain	=B7*\$B\$16	=C7*\$B\$16	=D7*\$B\$16	=E7*\$B\$16	=SUM(B21:E21)			
22	France	=B8*\$B\$16	=C8*\$B\$16	=D8*\$B\$16	=E8*\$B\$16	=SUM(B22:E22)			
23	Germany	=B9*\$B\$16	=C9*\$B\$16	=D9*\$B\$16	=E9*\$B\$16	=SUM(B23:E23)			
24	India	=B10*\$B\$16	=C10*\$B\$16	=D10*\$B\$16	=E10*\$B\$16	=SUM(B24:E24)			
25	Malaysia	=B11*\$B\$16	=C11*\$B\$16	=D11*\$B\$16	=E11*\$B\$16	=SUM(B25:E25)			
26	U.S.A.	=B12*\$B\$16	=C12*\$B\$16	=D12*\$B\$16	=E12*\$B\$16	=SUM(B26:E26)			
27	Total	=SUM(B19:B26)	=SUM(C19:C26)	=SUM(D19:D26)	=SUM(E19:E26)	=SUM(F19:F26)			
28									
29									
30									

Sheet1



Copy Formulas with Relative Cell References (Slide 1 of 2)

- Reuse formulas you have created
- Use Copy and Paste commands or the fill handle to copy formulas
- Copying a formula to a new cell
 - Excel substitutes new cell references so that the relationship of the cells to the formula remains unchanged
- Auto Fill feature can be used for filling cells with sequential text or values
 - Months of the year; days of the week; or text plus a number (Quarter 1, Quarter 2, etc.)
 - Drag the fill handle to extend an existing sequence



Copy Formulas with Relative Cell References (Slide 2 of 2)

Formula pasted in a range

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Your Name Share

Clipboard Font Alignment Number Styles Cells Editing

F5 X ✓ fx =SUM(B5:E5)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Tour Expenses by Quarter, FY 2017															
2																
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total										
4	Australia	6076.2	6173.82	7207.66	6624.19	26081.87										
5	Brazil	3610.99	4021.46	4437.4	4658.11	16727.96										
6	Britain	4387.78	4471.98	4670.21	4200.04	17730.01										
7	France	4132.1	4589.74	4679.06	4793.72											
8	Germany	5182.77	3094.56	3661.12	3812.5											
9	India	1568.25	2610.3	2765.04	2990.95											
10	Malaysia	3371.5	3665.14	8340.35	3821.89											
11	U.S.A.	7295.06	6642.76	8340.46	7118.91											
12	Total	35624.65	35269.76	44101.3	38020.31											



Copy Formulas with Absolute Cell References (Slide 1 of 2)

- Apply absolute cell reference before copying a formula if you want one or more cell references to remain unchanged in relation to the formula



Copy Formulas with Absolute Cell References (Slide 2 of 2)

Absolute reference created in formula

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Your Name Share

Clipboard Font Alignment Number Styles Cells Editing

AVERAGE X ✓ f_x =F4*\$G\$2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Tour Expenses by Quarter, FY 2017						Change									
2							1.1									
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total		What if?								
4	Australia	6076.2	6173.82	7207.66	6624.19	26081.87		=F4*\$G\$2								
5	Brazil	3610.99	4021.46	4437.4	4658.11	16727.96		0								
6	Britain	4387.78	4471.98	4670.21	4200.04	17730.01		0								
7	France	4132.1	4589.74	4679.06	4793.72	18194.62		0								
8	Germany	5182.77	3094.56	3661.12	3812.5	15750.95		0								
9	India	1568.25	2610.3	2765.04	2990.95	9934.54		0								
10	Malaysia	3371.5	3665.14	8340.35	3821.89	19198.88		0								
11	U.S.A.	7295.06	6642.76	8340.46	7118.91	29397.19		0								
12	Total	35624.65	35269.76	44101.3	38020.31											
13																
14	20% rise	42749.58	42323.712	52921.56	45624.372											
15	Average	4453.0813	4408.72	5512.6625	4752.5388											
16	Maximum	7295.06	6642.76	8340.46	7118.91											
17	Minimum	1568.25	2610.3	2765.04	2990.95											
18																
19																
20		Quarter 1	Quarter 2	Quarter 3	Quarter 4											
21	30% rise	46312.045	45850.688	57331.69	49426.403											



Round a Value with a Function (Slide 1 of 2)

- Cells containing financial data are often easier to read if they contain fewer decimals
- Use the ROUND function to round down your results



Round a Value with a Function (Slide 2 of 2)

ROUND function added to an existing formula

EX 2-R2G Tour Expense Analysis.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Your Name Share

Clipboard Font Alignment Number Styles Cells Editing

AVERAGE X ✓ $\text{=ROUND}(B12+B12*0.2$

	A	B	C	ROUND(number, num_digits)	F	G	H	I	J	K	L	M	N	O	P
1	Tour Expenses by Quarter, FY 2017					Change									
2						1.2									
3		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total	What if?								
4	Australia	6076.2	6173.82	7207.66	6624.19	26081.87	31298.2								
5	Brazil	3610.99	4021.46	4437.4	4658.11	16727.96	20073.6								
6	Britain	4387.78	4471.98	4670.21	4200.04	17730.01	21276								
7	France	4132.1	4589.74	4679.06	4793.72	18194.62	21833.5								
8	Germany	5182.77	3094.56	3661.12	3812.5	15750.95	18901.1								
9	India	1568.25	2610.3	2765.04	2990.95	9934.54	11921.4								
10	Malaysia	3371.5	3665.14	8340.35	3821.89	19198.88	23038.7								
11	U.S.A.	7295.06	6642.76	8340.46	7118.91	29397.19	35276.6								
12	Total	35624.65	35269.76	44101.3	38020.31										
13															
14	20% rise	=ROUND(B1	42323.712	52921.56	45624.372										
15	Average	4453.0813	4408.72	5512.6625	4752.5388										
16	Maximum	7295.06	6642.76	8340.46	7118.91										
17	Minimum	1568.25	2610.3	2765.04	2990.95										
18															
19															
20		Quarter 1	Quarter 2	Quarter 3	Quarter 4										
21	30% rise	46312.045	45850.688	57331.69	49426.403										