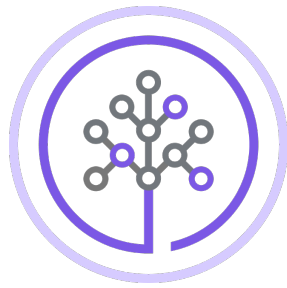


+-



**Skills**  
Network

## Hands-on Lab 4: Simple Use of Functions

---

**Estimated time needed:** 30 minutes

In this lab, first you will learn the basics of formulas, how to perform simple calculations, how to select ranges in formulas, and how to copy formulas. Next, you will learn the basics of functions, how to use some of the more common functions that a Data Analyst might employ, and look at some of the more advanced functions available in Excel. Finally, you will learn about referencing data in formulas; specifically how to differentiate between relative and absolute references, and you will also learn about error handling in formulas.

## Software Used in this Lab

---

The instruction videos in this course use the full Excel Desktop version as this has all the available product features, but for the hands-on labs we will be using the free 'Excel for the web' version as this is available to everyone.

Although you can use the Excel Desktop software if you have access to this version, [it is recommended that you use Excel for the web for the hands-on labs](#) as the lab instructions specifically refer to this version, and there are some small differences in the interface and available features.

## Dataset Used in this Lab

---

The dataset used in this lab is an internal dataset.

# Objectives

After completing this lab, you will be able to:

- Understand the basics of formulas
- Perform simple calculations
- Select ranges in formulas and copy formulas
- Understand the basics of functions
- Use common functions
- Understand the more advanced functions available
- Reference data in formulas
- Differentiate between relative and absolute references
- Understand how to handle formula errors

## Exercise 1: Basics of Formulas

In this exercise, you will learn the basics of formulas, how to perform simple calculations, how to select ranges in formulas, and how to copy formulas.

1. Download the file [Personal\\_Monthly\\_Expenditure\\_Lab4.xlsx](#). Upload and open it using Excel for the web. Go to the **Expense - 2018** worksheet.

	A	B	C	D	E	F	G
1	Month	Housing	Bills & Utilities	Food & Dining	Personal	Auto & Transport	Health & Fitness
2	Jan	£ 800.00	£ 210.00	£ 400.00	£ 100.00	£ 100.00	£ 60.00
3	Feb	£ 800.00	£ 180.00	£ 350.00	£ 100.00	£ 125.00	£ 70.00
4	Mar	£ 800.00	£ 170.00	£ 420.00	£ 100.00	£ 120.00	£ 60.00
5	Apr	£ 800.00	£ 160.00	£ 400.00	£ 120.00	£ 100.00	£ 60.00
6	May	£ 800.00	£ 150.00	£ 420.00	£ 100.00	£ 100.00	£ 80.00
7	Jun	£ 800.00	£ 150.00	£ 380.00	£ 100.00	£ 130.00	£ 60.00
8	Jul	£ 800.00	£ 150.00	£ 420.00	£ 120.00	£ 100.00	£ 60.00
9	Aug	£ 800.00	£ 150.00	£ 420.00	£ 100.00	£ 100.00	£ 80.00
10	Sep	£ 800.00	£ 150.00	£ 400.00	£ 120.00	£ 110.00	£ 60.00
11	Oct	£ 800.00	£ 170.00	£ 420.00	£ 100.00	£ 100.00	£ 60.00
12	Nov	£ 800.00	£ 200.00	£ 390.00	£ 120.00	£ 100.00	£ 50.00
13	Dec	£ 800.00	£ 220.00	£ 400.00	£ 100.00	£ 115.00	£ 60.00
14							

2. In **A14**, type **Totals** and in **B14**, type **=SUM(** then select cells **B2 to B13** with the mouse, and press **Enter**.
3. Select the **fill handle** on cell **B14** and drag to **G14** to copy the formula.

13	Dec	£ 800.00	£ 220.00	£ 400.00	£ 100.00	£ 115.00	£ 60.00
14	Totals	£ 9,600.00					
15							

3. In cell **H1**, type **Monthly Total** and double-click the divider between **H** and **I**.
4. In **H2**, type **=SUM(** then select cells **B2 to G2** with the mouse, and press **Enter**. If necessary, select the **fill handle** on cell **H2** and drag to **H14** to copy the formula.
5. Select columns **B to H**. On the **Home** tab, in the **Number** group, click the **Accounting Number Format (\$)** drop-down list, and select **\$ English (United States)**.

	A	B	C	D	E	F	G	H	I
1	Month	Housing	Bills & Utilities	Food & Dining	Personal	Auto & Transport	Health & Fitness	Monthly Total	
2	Jan	\$ 800.00	\$ 210.00	\$ 400.00	\$ 100.00	\$ 100.00	\$ 60.00	\$ 1,670.00	
3	Feb	\$ 800.00	\$ 180.00	\$ 350.00	\$ 100.00	\$ 125.00	\$ 70.00	\$ 1,625.00	
4	Mar	\$ 800.00	\$ 170.00	\$ 420.00	\$ 100.00	\$ 120.00	\$ 60.00	\$ 1,670.00	
5	Apr	\$ 800.00	\$ 160.00	\$ 400.00	\$ 120.00	\$ 100.00	\$ 60.00	\$ 1,640.00	
6	May	\$ 800.00	\$ 150.00	\$ 420.00	\$ 100.00	\$ 100.00	\$ 80.00	\$ 1,650.00	
7	Jun	\$ 800.00	\$ 150.00	\$ 380.00	\$ 100.00	\$ 130.00	\$ 60.00	\$ 1,620.00	
8	Jul	\$ 800.00	\$ 150.00	\$ 420.00	\$ 120.00	\$ 100.00	\$ 60.00	\$ 1,650.00	
9	Aug	\$ 800.00	\$ 150.00	\$ 420.00	\$ 100.00	\$ 100.00	\$ 80.00	\$ 1,650.00	
10	Sep	\$ 800.00	\$ 150.00	\$ 400.00	\$ 120.00	\$ 110.00	\$ 60.00	\$ 1,640.00	
11	Oct	\$ 800.00	\$ 170.00	\$ 420.00	\$ 100.00	\$ 100.00	\$ 60.00	\$ 1,650.00	
12	Nov	\$ 800.00	\$ 200.00	\$ 390.00	\$ 120.00	\$ 100.00	\$ 50.00	\$ 1,660.00	
13	Dec	\$ 800.00	\$ 220.00	\$ 400.00	\$ 100.00	\$ 115.00	\$ 60.00	\$ 1,695.00	
14	Totals	\$ 9,600.00	\$ 2,060.00	\$ 4,820.00	\$ 1,280.00	\$ 1,300.00	\$ 760.00	\$ 19,820.00	
15									

## Exercise 2: Basics of Functions

In this exercise, you will have an introduction to functions, including using some common statistical functions, and then you will learn about some more advanced functions that a Data Analyst might also use.

1. In cells **A16-A20**, type the following:
  - **Avg**
  - **Min**
  - **Max**
  - **Count**
  - **Median**

2. In **B16**, type **=AVERAGE(** then select cells **B2 to B13** with the mouse, and press **Enter**. Select the **fill handle** on cell **B16** and drag to **G16** to copy the formula.
3. In **B17**, type **=MIN(** then select cells **B2 to B13** with the mouse, and press **Enter**. Select the **fill handle** on cell **B17** and drag to **G17** to copy the formula.
4. In **B18**, type **=MAX(** then select cells **B2 to B13** with the mouse, and press **Enter**. Select the **fill handle** on cell **B18** and drag to **G18** to copy the formula.
5. In **B19**, type **=COUNT(** then select cells **B2 to B13** with the mouse, and press **Enter**. Select the **fill handle** on cell **B19** and drag to **G19** to copy the formula. Select row **19**. On the **Home** tab, click the **Number Format** drop-down list, and select **Number**.
6. In **B20**, type **=MEDIAN(** then select cells **B2 to B13** with the mouse, and press **Enter**. Select the **fill handle** on cell **B20** and drag to **G20** to copy the formula.

	A	B	C	D	E	F	G
16	Avg	\$ 800.00	\$ 171.67	\$ 401.67	\$ 106.67	\$ 108.33	\$ 63.33
17	Min	\$ 800.00	\$ 150.00	\$ 350.00	\$ 100.00	\$ 100.00	\$ 50.00
18	Max	\$ 800.00	\$ 220.00	\$ 420.00	\$ 120.00	\$ 130.00	\$ 80.00
19	Count	12.00	12.00	12.00	12.00	12.00	12.00
20	Median	\$ 800.00	\$ 165.00	\$ 400.00	\$ 100.00	\$ 100.00	\$ 60.00

7. Explore some more commonly used functions of a data analyst by clicking the arrow under **AutoSum**, then select **More Functions** and look at some of the functions in various categories to see what actions they perform:
  - [Financial](#) : ACCRINT, INTRATE
  - [Logical](#) : AND, IF, OR, NOT
  - [Text](#) : CONCAT, FIND, SEARCH
  - [Date & Time](#) : NETWORKDAYS, WEEKDAY
  - [Lookup & Reference](#) : AREAS, SORTBY, VLOOKUP, HLOOKUP
  - [Math & Trig](#) : POWER, SUMIF, SUMPRODUCT
  - [Statistical](#) : AVERAGE, COUNTIF, MAX, MEDIAN, MIN

## Exercise 3: Referencing Data in Formulas (relative vs absolute) & Formula Errors

---

In this exercise, you will learn how to reference data in formulas; specifically differentiating between relative and absolute references, and you will also learn about error handling in formulas.

1. In cells **A31-A40**, type **1-10**. Select row **31 to 40**. On the **Home** tab, click the **Number Format** drop-down list, and select **General**.
2. [Relative References](#) : In cell **B33**, type **=A31+A32** and press **Enter**. Select the **fill handle** on cell **B33** and drag to **B40** to copy the formula. Here, both first and second cell reference will move 1 cell down. For example, on cell **B34** formula will be changed to **=A32+A33**, on cell **B35** formula will be changed to **=A33+A34** and so on.
3. [Absolute References](#) : In cell **C33**, type **=\$A\$31+\$A\$32** and press **Enter**. Select the **fill handle** on cell **C33** and drag to **C40** to copy the formula. Here, both first and second cell references will not change. For example, on cell **C34** formula will remain **=\$A\$31+\$A\$32**, on cell **C35** formula will remain **=\$A\$31+\$A\$32** and so on.
4. [Mixed References](#) : In cell **D33**, type **=\$A\$31+\$A32** and press **Enter**. Select the **fill handle** on cell **D33** and drag to **D40** to copy the formula. Here, first cell reference will stay the same, but the second reference will change. For example, on cell **D34** formula will be changed to **=\$A\$31+\$A33**, on cell **D35** formula will be changed to **=\$A\$31+\$A34** and so on.

	A	B	C	D
30		Relative	Absolute	Mixed
31	1			
32	2			
33	3	3	3	3
34	4	5	3	4
35	5	7	3	5
36	6	9	3	6
37	7	11	3	7
38	8	13	3	8
39	9	15	3	9
40	10	17	3	10

5. In cell **B31**, type **=A16+A17**. Now this will lead to a formula error **#VALUE!** since cells **A16** and **A17** do not contain any number.

	A	B	C	D	E
30		Relative	Absolute	Mixed	
31	1	#VALUE!	<div> Error in Value  A value used in the formula is of the wrong data type.  <span>?</span> <span>⚠</span> </div>		
32	2				
33	3	3			
34	4	5			
35	5	7			
36	6	9			
37	7	11			
38	8	13	3	8	
39	9	15	3	9	
40	10	17	3	10	

6. Click the **question mark icon** in the error message box. This will open the **Help** for this topic. Read through this help file for more information about **#VALUE!** errors in formulas.

The screenshot shows an Excel spreadsheet with a #VALUE! error in cell B31. The formula bar indicates the formula is `=A16+A17`. The error message box states: "Error in Value. A value used in the formula is of the wrong data type." The Help pane on the right provides guidance on correcting this error.

**How to correct a #VALUE! error**

#VALUE is Excel's way of saying, "There's something wrong with the way your formula is typed. Or, there's something wrong with the cells you are referencing." The error is very general, and it can be hard to find the exact cause of it. The information on this page shows common problems and solutions for the error. You may need to try one or more of the solutions to fix your particular error.

**Fix the error for a specific function**

Which function are you using?

**Problems with subtraction**

- How to do basic subtraction
- #VALUE! with basic subtraction
- How to subtract dates
- #VALUE! error subtracting dates stored as text

**Problems with spaces and text**

- Remove spaces that cause #VALUE!
- Check for text or special characters

**Congratulations! You have completed Lab 4, and you are ready for the next topic.**

## Author(s)

- [Sandip Saha Joy](#)

## Other Contributor(s)

- [Steve Ryan](#)

**© IBM Corporation 2020. All rights reserved.**