

EXCEL TRAINING

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Module 5 – TEXT FUNCTIONS

Topics

1. Upper / Lower / Proper / Trim functions
2. Concatenate
3. Text / Values
4. Left / Mid / Right / Len functions
5. Search / Find

Objectives:

At the end of the module the participant is expected to:

1. Understand and apply the different text function such as:
 - a. Upper / Lower / Proper / Trim functions
 - b. Concatenate
 - c. Text / Values
 - d. Left / Mid / Right / Len functions
 - e. Search / Find

TRIM/UPPER/LOWER/PROPER FUNCTIONS

Text functions can be used to standardize formatting, particularly the **TRIM**, **UPPER**, **LOWER**, and **PROPER** functions:

A	B	C	D
Sample Text String	Formula	Output	Notes
SAMPLE sentence	=TRIM(A2)	SAMPLE sentence	Removes any leading or trailing spaces from a text string
SAMPLE sentence	=LOWER(A3)	sample sentence	Converts all characters in a text string to lower case
SAMPLE sentence	=UPPER(A4)	SAMPLE SENTENCE	Converts all characters in a text string to upper case
SAMPLE sentence	=PROPER(A5)	Sample Sentence	Converts all characters in a text string to proper case (first letter capitalized)



PRO TIP:

If two text strings are identical except one has a trailing space, they will look exactly the same but Excel will treat them as completely different values; TRIM will make them equivalent

EXAMPLE

1. Open the DEMO_MODULE5 EXCEL FILE
2. Apply PROPER FUNCTION
3. Create new Column (COLUMN B) -> Proper First Name, use the formula then populate the column.

The screenshot shows a Microsoft Excel spreadsheet. The top ribbon has tabs for Home, Insert, Page Layout, Formulas, Data, etc. Below the ribbon, the formula bar shows the formula =TRIM(Proper(A2)). The main area shows a table with columns labeled B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. Row 1 contains headers: Proper First Name, M.I., Last Name, Gen, and first names like John, Smith, etc. Row 2 contains data: (PROPER(A2)), J, MCGRATH, fer, and Lewis. A green selection bar is visible above row 2, indicating it is selected.

4. Insert a New Column (AFTER D) -> Proper Last Name

=TRIM(Proper(D2))

C	D	E	F
I.	Last Name	Proper Last N	Gender
	MCGRATH	=TRIM(Proper(D2))	
	LEWIS	PROPER(tex	male

CONCATENATE

CONCATENATE allows you to combine text, cell values, or formula outputs into a single text string

Note: Rather than typing “=CONCATENATE(Text1, Text2...)”, you can simply separate each piece of the resulting text string with an ampersand (“&”)

A	B	C	D
1	First Name	Last Name	Formula
2	Daniel	Wright	=A2&B2
3	Daniel	Wright	=A3&" "&B3
4	Daniel	Wright	=LEFT(A4,3)&" "&B4
5	Daniel	Wright	=LEFT(A5,3)&" "&LEFT(B5,1)&"."

EXAMPLE

1. Create a new column (COLUMN F) -> FullName, the concatenate the Proper First Name, M.I. and Proper Last Name

=B2&" "&C2&" "&E2

C	D	E	F
M.I.	Last Name	Proper Last N	Full Name
	MCGRATH	Mcgrath	=B2&" "&C2&" "&E2
	LEWIS	Lewis	

2. Create a new column (COLUMN L) -> Full Address, Concatenate column H, I, J and K

L	Full Address	E-mail
031	=H2&", "&I2&", "&J2&", "&K2	
936		ChadSLewis@aol

LEFT / MID / RIGHT AND LEN FUNCTION

The **LEFT**, **MID**, and **RIGHT** functions return a specific number of characters from a location within a text string, and **LEN** returns the total number of characters

```
=LEFT(text, [num_chars])
=RIGHT(text, [num_chars])
=MID(text, start_num, num_chars)
```

A	B	C	D
Sample Text String	Formula	Output	Notes
MA-02215%AAA%_100	=LEFT(A3,2)	MA	Returns 2 characters, starting from the left
MA-02215%AAA%_100	=MID(A5,4,5)	02215	Returns 5 characters from the middle of the string, starting with position 4
MA-02215%AAA%_100	=RIGHT(A7,3)	100	Returns 3 characters, starting from the right
MA-02215%AAA%_100	=LEN(A9)	17	Returns the length of the string (=17 characters)

EXAMPLE

- CREATE 3 column after Telephone
 - Area CODE
 - Prefix
 - Line Number

AREA CODE

N	O	P
Telephone	Area Code	Prefix
618-376-3064	=LEFT(N2,3)	
530-289-3807		LEFT(text, [num_chars])

PREFIX

P	Q
Prefix	Line Number
=MID(N2,5,3)	
	MID(text, start_num, num_chars)

LINE NUMBER

Q	R	S
Line Number	Nati	
=RIGHT(N2,4)	84	
	RIGHT(text, [num_chars])	50

44

TEXT - VALUE

The **TEXT** function converts a numeric value to text and assigns a particular format

=TEXT(value, format_text)

	A	B
1	Name	Earnings
2	Tim	\$4,500
3	George	\$3,250
4	Lisa	\$3,725



=“Lisa earned ”&B4 returns “Lisa earned 3725”

=“Lisa earned ”&TEXT(B4“#,###”) returns “Lisa earned \$3,725”



PRO TIP:

Use **VALUE** to convert a text string that represents a number into a value

EXAMPLE

1. Insert new column after K named it as New ZIP CODE.

ZipCode	New ZIP	Full Addr
62031	=TEXT(K2,"#####")	
95936		267 Franc
7040		4620 Will

2. Since the format will not match, modify the function using the if statement

```
=IF(LEN(K2)=5,TEXT(K2,"#####"),IF(LEN(K2)=4,TEXT(K2,"0#####")))
```

SEARCH / FIND FUNCTION

The **SEARCH** function returns the number of the character at which a specific character or text string is first found (otherwise returns #VALUE! error)

=SEARCH(find_text, within_text, [start_num])

What character or string are you searching for?

Where is the text that you're searching through?

Search from the beginning (default) or after a certain number of characters?

A	B	C	D
MA-02215%AAA%_100	=SEARCH("%",A11)	9	Searches the string for "%" and returns the position
MA-02215%AAA%_100	=SEARCH("%",A13,10)	13	Searches for "%", starting with the 10th character, and returns the position
MA-02215%AAA%_100	=MID(A13,SEARCH("%",A13),5)	%AAA%	Returns 5 chars from the middle of the string, beginning where it finds "%"
MA-02215%AAA%_100	=MID(A13,SEARCH("%",A13)+1,3)	AAA	Returns 3 chars from the middle of the string, beginning 1 position after "%"



PRO TIP:

The **FIND** function works exactly the same way, but is case-sensitive

EXAMPLE

1. Create a new Column USERNAME after EMAIL (COLUMN O)

=LEFT(N3,16)

M	N	O
ss	E-mail	Username
Street, Fieldon, IL, 62031	JenniferJMcGrath@gmail.com	JenniferJMcGrath

2. Update the formula

=LEFT(N2,SEARCH("@",N2))

M	N	O
ss	E-mail	Username
Street, Fieldon, IL, 62031	JenniferJMcGrath@gmail.com	=LEFT(N2,SEARCH("@",N2))

3. Update the formula again to remove the @ sign.

=LEFT(N2,SEARCH("@",N2)-1)

M	N	O
ss	E-mail	Username
Street, Fieldon, IL, 62031	JenniferJMcGrath@gmail.com	JenniferJMcGrath

ISNUMBER

IF(ISNUMBER(SEARCH is powerful combination of functions that can be used to classify data based on cells that contain specific strings of text

=IF(ISNUMBER(SEARCH(find_text, within_text)), value_if_true, value_if_false)

Searches for a specific string of text within a given cell

Returns one value if that string is found (TRUE), and another if it is not found (FALSE)

A	B
1 Placement	Media
2 12983-Aff-160x90_small	Other
3 982308-Disp-160x90_large	Display
4 23124-Aff-160x90_small	Other
5 463-Disp-160x90_small	Display
6 390238-Agg-160x90_large	Other

=IF(ISNUMBER(SEARCH("Disp",A2)),"Display","Other")

Search the cells in column A for the text string "Disp" and classify column B as "Display" if you find it, "Other" if you don't

4. Add new Column After Email, Column O give it a name Provider.

M	N	O	P
ess Street, Fieldon, IL, 62031	E-mail JenniferJMcGrath@gmail.com	Provider gmail	Username JenniferJMcGrath

5. Create a new Column, give it a name (Short ID) after the National ID column.

RIGHT(U2,SEARCH("-",U2))

U	V	W
NationalID	Short ID	
84-	=RIGHT(U2,SEARCH("-",U2))	
60-851	SEARCH(find_text, within_1	
44-5370		

6. Update the formula

```
=RIGHT(U4,LEN(U4)-SEARCH("-",U4))
```

```
=RIGHT(U2,LEN(U2)-SEARCH("-",U2))
```

Q	R	S	T	U	V
Telephone	Area Code	Prefix	Line Number	NationalID	Short ID
618-376-3064	618	376	3064	84-158	=RIGHT(U2,LEN(U2)-SEARCH("-",U2))

7. Add another column after E-mail assign Email Service as name of the column.

```
=RIGHT(N2,LEN(N2)-SEARCH("@",N2))
```

N	O	P
E-mail	E-mail Service	
JenniferJMcGrath@gmail.com	gmail.co	gr
ChadStevens@aol.com	aol.com	

Module 6 – DATE AND TIME FUNCTION

Topics:

1. DATE / TIME 101
2. TODAY() AND NOW() FUNCTION
3. YEAR/ MONTH/DAY/HOUR/MINUTE/SECOND FUNCTION
4. EOMONTH / YEARPRAC. FUNCTION
5. WEEKDAY/WORKDAY/NETWORKDAYS

Objectives:

At the end of the module the participant is expected to:

1. Understand and apply the different date and time functions:
 - a. TODAY() AND NOW() FUNCTION
 - b. YEAR/ MONTH/DAY/HOUR/MINUTE/SECOND FUNCTION
 - c. EOMONTH / YEARPRAC. FUNCTION
 - d. WEEKDAY/WORKDAY/NETWORKDAYS

DATE VALUE

Every date in Excel has an associated **date value, which is how Excel calculates the passage of time (using midnight on 1/1/1900 as the starting point)**

Excel recognizes most typed dates and automatically applies a common format (i.e. m/d/yyyy), along with an associated date value (cell format → General)

Note: If you type a date in a format that Excel does NOT recognize, it will be treated as text and there will be no associated date value; however, you can use a **DATEVALUE** or **TIMEVALUE** function to convert unformatted dates or times into serial values

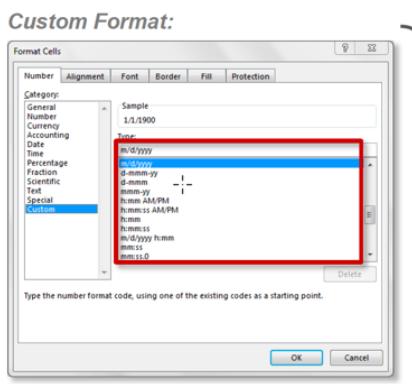
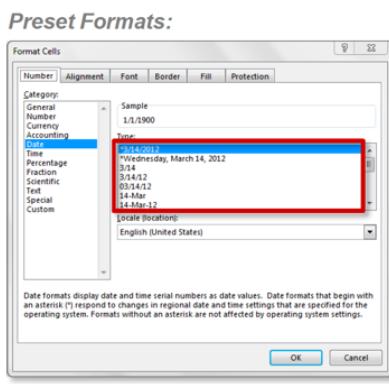
Date	Date Value
1/1/1900	1
1/11/1900	11
2/6/2015	42041
2/6/15 12:00 PM	42041.5
2/6/15 6:00 PM	42041.75

Jan 1, 1900 is the first date with an assigned date value (1). Feb 6, 2015 is the 42,041st day since 1/1/1900, so its date value = 42041

Date values can also indicate fractions of days: 42041.5 translates to noon on 2/6/2015 (50% through the day), and 42041.75 translates to 6:00pm on 2/6/2015 (75% through the day)

DATE FORMATTING

To format dates in Excel, you can either select a preset option from the “Date” category of the “Format Cells” dialog box, OR create your own **custom format**



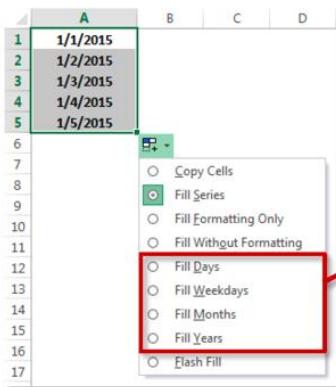
You can build your own custom formats using combinations of date/time codes. For example:

d = day w/out leading zero (1-31)
dd = day w/ leading zero (01-31)
ddd = day-of-week (Sat)
ddd = day-of-week (Saturday)
m = month w/out leading zero (1-12)
mm = month w/ leading zero (01-12)
mmm = month abbreviation (Jan)
mmmm = full month (January)
yy = last 2 digits of year (15)
yyyy = full year (2015)

(full list available at support.office.com)

FILL SERIES

When you drag the corner of a cell containing a date, Excel automatically applies subsequent values automatically using **Fill Series** options:



Click the **Auto Fill Options** button to determine exactly which values your subsequent cells should take:

Copy Cells = Repeats the same value in all cells

Fill Days = Increases the date by 1 day per cell

Fill Weekdays = Increases the date by 1 day per cell (excluding weekends)

Fill Months = Increases the date by 1 month per cell

Fill Years = Increases the date by 1 year per cell

TODAY /NOW FUNCTION

The **TODAY()** and **NOW()** functions return the current date or exact time

Note: These are volatile functions, meaning that they change with every worksheet calculation

TODAY() = **2/6/2015**
NOW() = **2/6/2015 17:15**

This is what the **TODAY()** and **NOW()** functions return at 5:15pm on February 6, 2015. Note that these values will automatically update with every change made to the workbook



PRO TIP:

Make sure to enter **TODAY()** and **NOW()** functions with both parentheses included – these functions don't refer to other cells

EXAMPLE

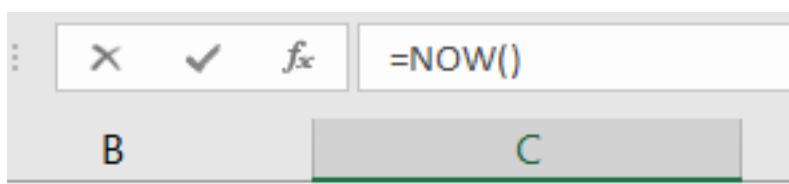
1. DEMO_MODULE6 EXCEL FILE

Perform the following



Current Date: =TODAY()

2. =TODAY()



Current Date: 11/02/2020

Current Time: =NOW()

SERIALIZATION FORMULA

Excel will always calculate dates and times based on their *precise* underlying serial values, but what if you need to work with less-specific values, like months instead of days, or hours instead of seconds?

The **YEAR**, **MONTH**, **DAY**, **HOUR**, **MINUTE**, and **SECOND** functions extract individual components of a given date:

	A	B	C	D	E	F	G
1		YEAR	MONTH	DAY	HOUR	MINUTE	SECOND
2	2/6/2015 17:57	2015	2	6	17	57	16
3		=YEAR(A2)	=MONTH(A2)	=DAY(A2)	=HOUR(A2)	=MINUTE(A2)	=SECOND(A2)
4							

Current Year: =year(C2)

Current Month: =MONTH(C2)

Current Day: `=day(C3)`

Current Hour: `=HOUR(C3)`

Current Minute: `=MINUTE(C3)`

Current Second: `=SECOND(C3)`

EOMONTH FUNCTION

Use the **EOMONTH** function to calculate the last day of a given month, or to calculate the start/end dates of previous or future months

`=EOMONTH(start_date, months)`

Reference to the cell containing
the start/current date

Number of months before or after the start/current date (positive number
yields a date in the future, negative number yields a date in the past)

A	B	C
1		
2	<i>Current Date:</i>	8/3/2015
3		
4	<i>End of month:</i>	8/31/2015 → =EOMONTH(C2, 0)
5	<i>Start of Month:</i>	8/1/2015 → =EOMONTH(C2, -1)+1
6	<i>Start of Next Month:</i>	9/1/2015 → =EOMONTH(C2, 0)+1

Last day of Month: `=EOMONTH(C2,0)`

First day of Year: `01/01/2020`

`=EOMONTH(C2,(-1*MONTH(C2)))+1`

First day of Year: `01/01/2020`

YEARFRAC FUNCTION

YEARFRAC calculates the fraction of a year represented by the number of whole days between two dates

=YEARFRAC(start_date, end_date, [basis])

Reference to the cell containing the start date Reference to the cell containing the end date Option specify the type of day count to use:

0 (default) = US (NASD) 30/360
1 = actual/actual (**RECOMMENDED**)
2 = actual/360
3 = actual/365
4 = European 30/360

A B

1	
2	Start Date: 1/1/2015
3	End Date: 2/28/2015
4	

=YEARFRAC(B2, B3, 1) = 15.9%
=YEARFRAC(B2, B3, 2) = 16.1%

PRO TIP:
YEARFRAC is a great tool for pacing and projection calculations

=YEARFRAC(C14,C2,1)

% through year: 11%

WEEKDAY

If you want to know which day of the week a given date falls on, there are two ways to do it:

- 1) Use a custom cell format of either “ddd” (Sat) or “ddddd” (Saturday)
-Note that this doesn't change the underlying value, only how that value is displayed
- 2) Use the **WEEKDAY** function to return a serial value corresponding to a particular day of the week (either 1-7 or 0-6)

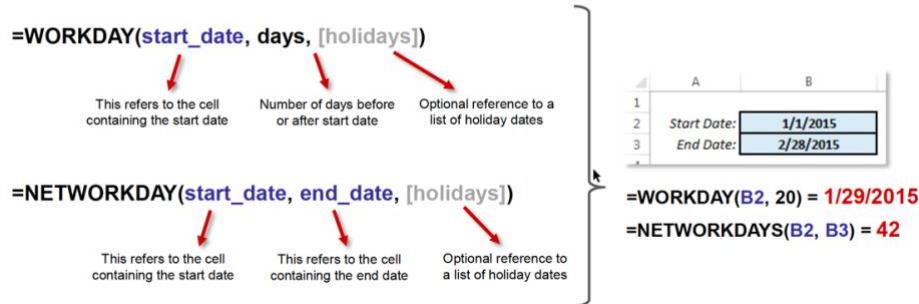
=WEEKDAY(serial_number, [return type])

This refers to a cell containing a date or time

0 (default) = Sunday (1) to Saturday (7)
1 = Monday (1) to Sunday (7)
3 = Monday (0) to Sunday (6)

WORKDAY / NETWORKDAY FUNCTION

WORKDAY returns a date that is a specified number of days before or after a given start date, excluding weekends and (optionally) holidays; **NETWORKDAYS** counts the number of workdays between two dates:



Example

Input a date for Project due date.

Compute for Date due.

Excel Formula Bar: =F3-C2					
B	C	D	E	F	
Current Date:	11/02/2020				
Current Time:	11/02/2020 8:08				
Project Due Date:		05/05/2022			
Current Year:	2020				
Days until due:		814			

Compute for # Workdays until due

Excel Formula Bar: =NETWORKDAYS(C2,F3)					
B	C	D	E	F	
Current Date:	11/02/2020				
Current Time:	11/02/2020 8:09				
Project Due Date:		05/05/2022			
Current Year:	2020				
Current Month:	2				
Current Day:	11				
Days until due:		814			
# Workdays until Due:		583			
Day of Week:					

Holiday

B		NETWORKDAYS(start_date, end_date, [holidays])	E	F	G	H
Current Date:	11/02/2020					
Current Time:	11/02/2020 8:12		Project Due Date:	05/05/2022		
Current Year:	2020		Days until due:	814		
Current Month:	2		# Workdays until Due:	H6		
Current Day:	11		Day of Week:			
Current Hour:	8					
Current Minute:	12					
Current Second:	12					
Current Millisecond:	12					

Day of week

=WEEKDAY(F3) -> then format using custom (DDDD)

DATEIF

DATEDIF calculates the number of days, months, or years between two dates

=DATEDIF(start_date, end_date, unit)

Reference to the cell containing the start date

Reference to the cell containing the end date

How do you want to calculate the difference?

"D" = # of days between dates

"M" = # of months between dates

"Y" = # of years between dates

"MD" = # of days between dates, ignoring months and years

"YD" = # of days between dates, ignoring years

“YM” = # of months between dates, ignoring days and years

	A	B
1	<i>Start Date:</i>	1/1/2015
2	<i>End Date:</i>	2/28/2015

=DATEDIF(B2, B3, "D") = 58
=DATEDIF(B2, B3, "MD") = 27



PRO TIP:

If you only need to calculate the # of days between dates, just use subtraction

=DATEDIF(\$C\$2,\$F\$3,"M")

Months Remaining: 26

=DATEDIF(C2,F3,"Y")

Years Remaining:

```
=DATEDIF(C2,F3,"D")
```

C

D

E

F

G

H

2/11/2020
11/02/2020 8:48

Project Due Date: 05/05/2022

2020

Days until due:

814

814

EXERCISE

Open the Monthly Budget Pricing tool.

1. Get the Current Date from the Sample data sheet.

Current Date: Data'!A:A

```
=MAX('Sample Data'!A:A)
```

B

C

D

E

F

G

Current Date: Data'!A:A

Start Date:

% of Month:

Monthly Budget:

Monthly Expenses:

% of Budget:

FORMAT m/dd/yyyy

2. Compute for the Start date

Current Date: 5/16/2015

```
=EOMONTH(C2,-1)+1
```

B

C

D

E

Current Date: 5/16/2015

Start Date: 01/05/2015

Mon

Month

3. Compute for % of Month. (REFER TO TABLE BELOW)

	=C2-C3)/VLOOKUP(MONTH(C2),B24:C35,2,0)	D	E	F	G
--	--	---	---	---	---

4. Enter Monthly budget 2500

5. Goto the SAMPLE DATA SHEET

Create a new column (A) (Give it a name MONTH)
 $=MONTH(b2)$

6. Go back to the Monthly Budget Pacing Tool Sheet

7. Compute the Monthly Expenses using the SUMIFS function

$=SUMIFS('Sample Data'!C:C,'Sample Data'!A:A,MONTH('Monthly Budget Pacing Tool'!C2))$

8. Add a text name month

$=month(c2)$

$=SUMIFS('Sample Data'!C:C,'Sample Data'!A:A,D2)$

add month					
Current Date:	5/16/2015	5	Monthly Budget:	\$2,500	
Start Date:	01/05/2015		Monthly Expenses:	\$1,603	\$1,603
% of Month:	48.4%		% of Budget:		

9. Compute for % of BUDGET

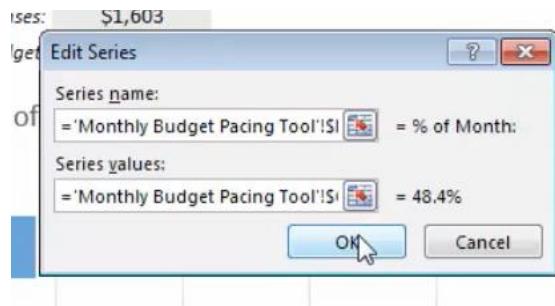
$=F3/F2$

add month					
Current Date:	5/16/2015	5	Monthly Budget:	\$2,500	
Start Date:	01/05/2015		Monthly Expenses:	\$1,603	\$1,603
% of Month:	48.4%		% of Budget:		64.1%

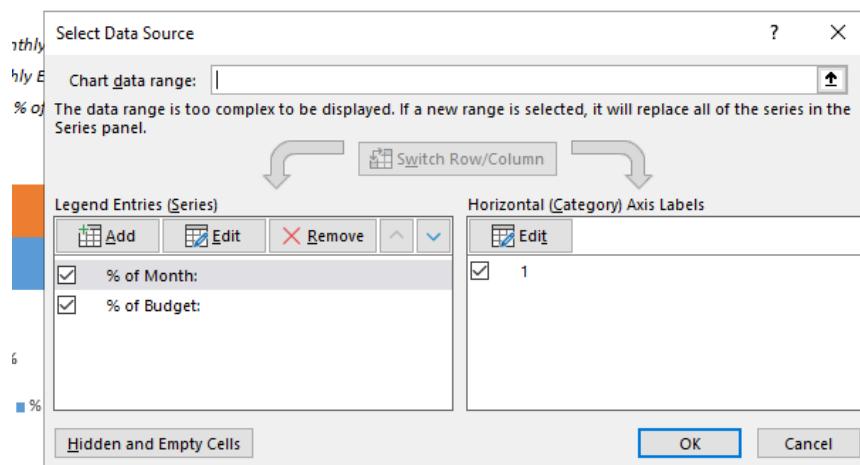
10. Click on the GRAPH

11. Right click to select data. SELECT DATA SOURCE

12. Click Add



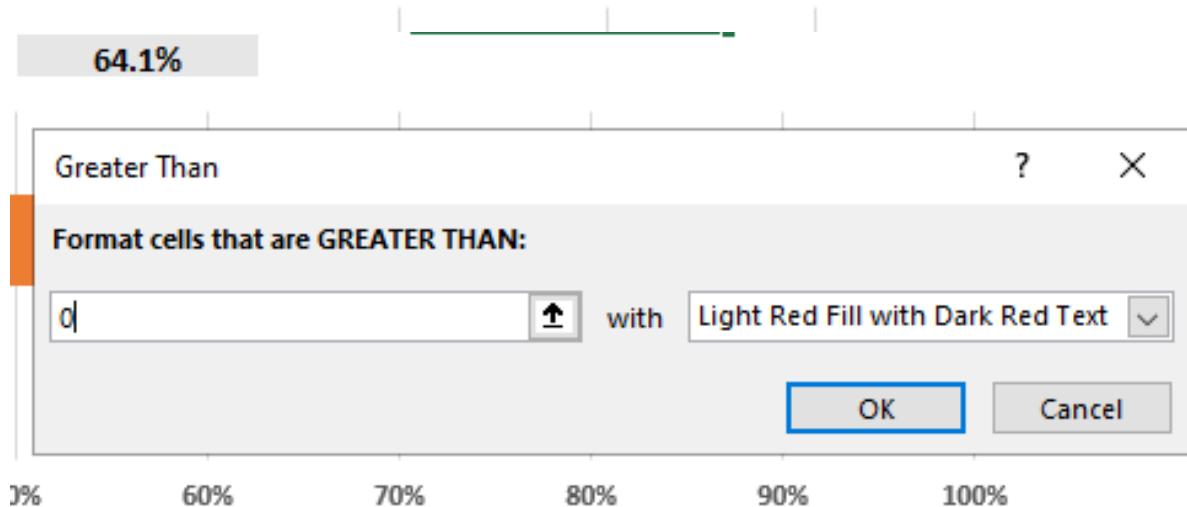
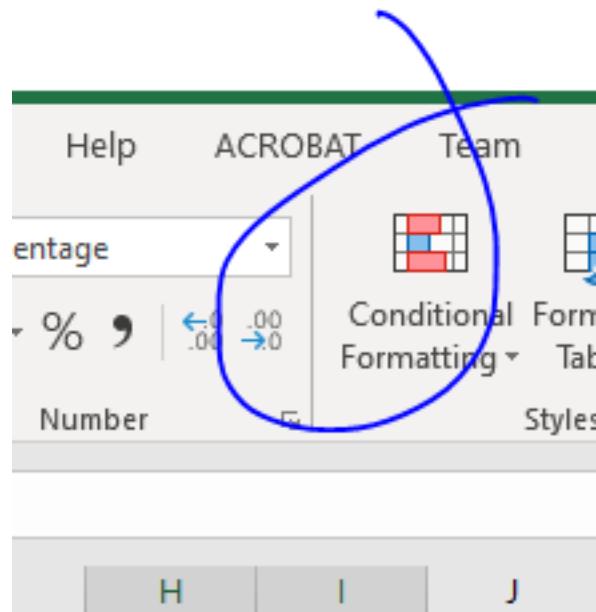
13. Add one more series

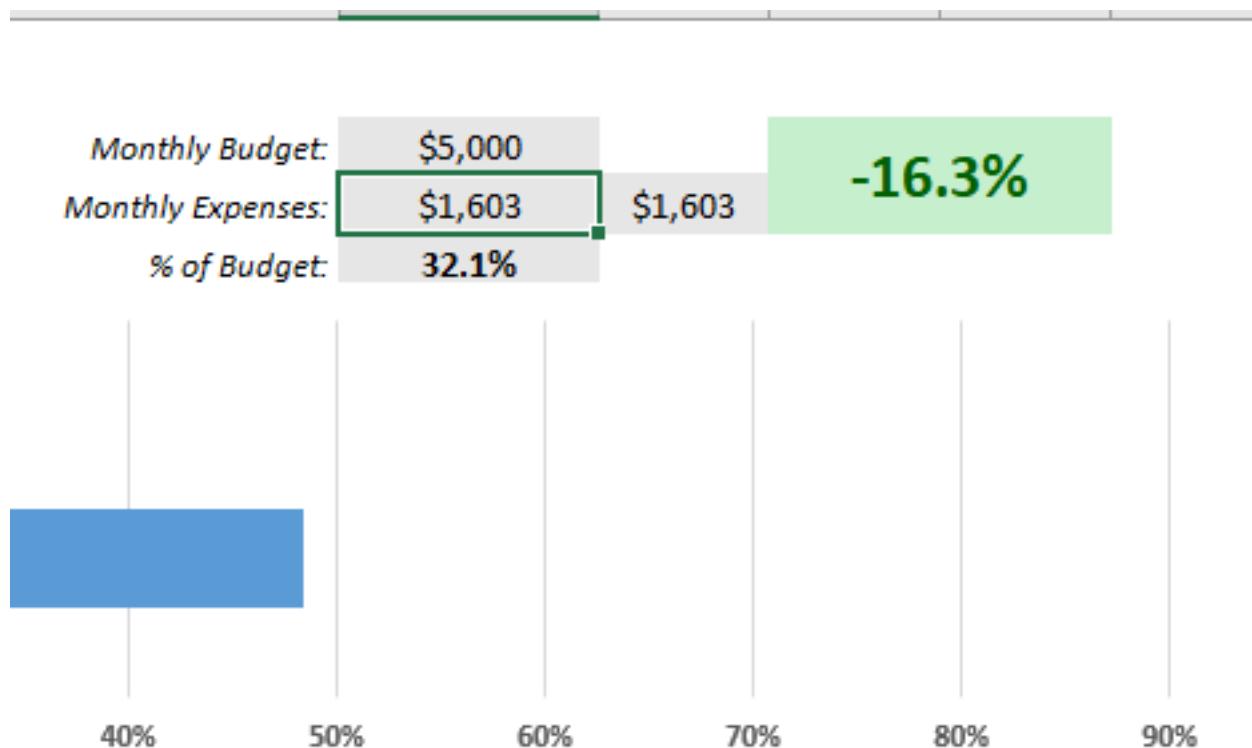


=F4-C4

14. Compute for the value under H2.

15. Select the Conditional format





Budget: ■ % of Month:

16. =IF(H2>0,"Over","Under")

Module 7 – FORMULA BASED FORMATTING

Topics:

1. DEMO - Highlighting every row with the MOD() Function
2. DEMO – Formatting cells based on the value of another cell
3. DEMO – Formatting rows using statistical function
4. DEMO – Formatting rows using text functions

Objectives:

At the end of the module the participant is expected to:

1. Understand and apply the different formula base formatting:
 - a. DEMO - Highlighting every row with the MOD() Function
 - b. DEMO – Formatting cells based on the value of another cell
 - c. DEMO – Formatting rows using statistical function
 - d. DEMO – Formatting rows using text functions

FORMULA BASED FORMATTING

If you want to go rogue, you can adjust the style of existing conditional formats or create your own **formula-based rules**

The screenshot illustrates the process of applying formula-based conditional formatting in Microsoft Excel.

Left Panel: Shows the "Conditional Formatting" ribbon tab with various rules categories like "Highlight Cells Rules", "Top/Bottom Rules", "Data Bars", "Color Scales", "Icon Sets", and "New Rule...". A red box highlights the "New Rule..." option, and a red arrow points from it to the main dialog.

Center Dialog: The "New Formatting Rule" dialog is open, showing the "Select a Rule Type" section with "Format all cells based on their values" selected. Below it, the "Edit the Rule Description" section shows "Format all cells based on their values" and "Format Style: 2-Color Scale". It includes fields for "Minimum" (Type: Lowest Value, Value: 1, Color: Red), "Maximum" (Type: Highest Value, Value: 5, Color: Yellow), and "Format with...".

Right Dialog: Another "New Formatting Rule" dialog is shown, identical to the first but with a different formula: "Format values where this formula is true: =OR(\$G\$3=\$D\$12,\$G\$3=\$F\$12)".

Table: A table titled "State: Arizona" displays data for various states. The row for Arizona has columns B through H filled with green and bold text, indicating the application of the conditional format.

Bottom Dialog: An "Edit Formatting Rule" dialog is open, showing the same rule type and formula: "Format values where this formula is true: =\$B6:\$H6=\$C\$2". It also shows a preview of the green fill and bold text.

Annotations:

- "This is where you can add, clear, and manage your conditional formatting rules" is written near the center dialog.
- "In this example we're formatting the cells in columns B through H with a green fill and bold text, but only when the state name is equal to the value in cell \$C\$2" is written near the table.
- "Note that the row label is relative (no "\$"), which allows us to apply this formatting to other rows without losing functionality" is written near the bottom dialog.

DEMO 1

- HIGHLIGHT EVERY OTHER ROW
- CREATE DATA ARRAY
- A2 ONWARDS

The screenshot shows a Microsoft Excel spreadsheet titled "HJT_DEMO_MODULE7". The table contains data for various US states and years, with columns for State, Year, and two numerical values. The "New Formatting Rule" dialog box is open, overlaid on the spreadsheet. A red arrow points from the top right towards the dialog box. The dialog box has the following settings:

- Style: Classic
- Formula: =MOD(ROW(),2)=1
- Format with: Light Red Fill with Dark Red T...

The formula bar at the bottom of the Excel window also shows the formula =MOD(ROW(),2)=1.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
20	Louisiana	2014	4,468,976	626,279											
21	Maine	2014	1,274,923	223,196											
22	Maryland	2014	5,296,486	1,399,498											
23	Massachusetts	2014	6,349,097	1,348,044											
24	Michigan	2014	9,938,444	1,014,215											
25	Minnesota	2014	4,919,479	1,195,975											
26	Mississippi	2014	2,844,658	163,633											
27	Missouri	2014	5,595,211	737,321											
28	Montana	2014	902,195	208,952											
29	Nebraska	2014	1,711,263	433,519											
30	Nevada	2014	1,998,257	454,379											
31	New Hampshire	2014	1,235,786	333,845											
32	New Jersey	2014	8,414,350	2,380,883											
33	New Mexico	2014	1,819,046	562,866											
34	New York	2014	18,976,457	3,423,896											
35	North Carolina	2014	8,049,313	1,305,166											
36	North Dakota	2014	642,200	91,162											
37	Ohio	2014	11,353,140	3,184,585											
38	Oklahoma	2014	3,450,654	265,245											
39	Oregon	2014	3,421,399	257,363											
40	Pennsylvania	2014	12,281,054	2,108,095											
41	Rhode Island	2014	1,048,319	171,152											
42	South Carolina	2014	4,012,012	411,020											
43	South Dakota	2014	754,844	102,597											
44	Tennessee	2014	5,689,283	634,265											
45	Texas	2014	20,851,820	2,299,911											
46	Utah	2014	2,233,169	388,385											
47	Vermont	2014	608,827	159,402											
48	Virginia	2014	7,078,515	1,438,739											
49	Washington	2014	5,894,121	1,371,306											
50	West Virginia	2014	1,808,344	533,270											
51	Wisconsin	2014	5,363,675	1,415,261											
52	Wyoming	2014	493,782	95,464											

- FORMULA IS =MOD(ROW(),2)=1 (ODD ROWS), =MOD(ROW(),2)=0 (EVEN ROWS)
- SELECT CUSTOM FORMAT
- SELECT LIGHT GREEN

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	State	Year	Total Population	Student Population											
2	Alabama	2014	4,447,100	948,435											
3	Alaska	2014	626,932	67,229											
4	Arizona	2014	5,130,632	1,396,669											
5	Arkansas	2014	2,673,400	257,943											
6	California	2014	33,871,648	8,492,127											
7	Colorado	2014	5,301,261	1,226,556											
8	Connecticut	2014	3,405,655	874,661											
9	Delaware	2014	983,600	104,161											
10	District of Columbia	2014	572,059	74,619											
11	Florida	2014	20,982,378	2,563,588											
12	Georgia	2014	8,186,453	1,245,631											
13	Hawaii	2014	1,211,537	350,042											
14	Idaho	2014	1,293,953	77,163											
15	Illinois	2014	12,419,293	1,493,403											
16	Indiana	2014	6,080,485	935,649											
17	Iowa	2014	2,926,324	282,183											
18	Kansas	2014	2,688,418	520,793											
19	Kentucky	2014	4,041,769	1,180,743											
20	Louisiana	2014	4,468,976	626,279											
21	Maine	2014	1,274,923	223,196											
22	Maryland	2014	5,296,486	1,399,498											
23	Massachusetts	2014	6,349,097	1,348,044											
24	Michigan	2014	9,938,444	1,014,215											
25	Minnesota	2014	5,919,479	1,195,975											
26	Mississippi	2014	2,844,658	163,633											
27	Missouri	2014	5,595,211	737,321											
28	Montana	2014	902,195	208,952											
29	Nebraska	2014	1,711,263	433,519											
30	Nevada	2014	1,998,257	454,379											
31	New Hampshire	2014	1,235,786	333,845											
32	New Jersey	2014	8,414,350	2,380,883											
33	New Mexico	2014	2,819,946	562,866											
34	New York	2014	19,333,800	3,433,800											

- EDIT RULE

Show formatting rules This Worksheet Change rule order:

Rule (applied in order shown)	Format	Applies to	Stop if true
Formula: =MOD(ROW(),2)=1	AaBbCcYyZz	\$A\$2:\$D\$52	

+ - Edit Rule... Cancel OK

- UPDATE

- FORMULA IS $=MOD(ROW(),2)=0$. (EVEN ROWS)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	State	Year	Total Population	Student Population											
2	Alabama	2014	4,447,100	948,435											
3	Alaska	2014	626,932	67,229											
4	Arizona	2014	5,130,632	1,396,669											
5	Arkansas	2014	3,010,400	722,943											
6	California	2014	33,871,648	8,492,127											
7	Colorado	2014	5,401,261	1,226,556											
8	Connecticut	2014	3,405,565	870,963											
9	D.C.	2014	783,600	166,161											
10	Delaware	2014	572,059	76,619											
11	Florida	2014	20,582,378	2,563,588											
12	Georgia	2014	8,186,453	424,631											
13	Hawaii	2014	1,211,537	350,042											
14	Idaho	2014	1,293,953	77,163											
15	Illinois	2014	12,419,293	1,493,403											
16	Indiana	2014	6,080,485	935,649											
17	Iowa	2014	3,064,224	220,888											
18	Kansas	2014	2,688,418	520,793											
19	Kentucky	2014	4,041,769	1,180,743											
20	Louisiana	2014	4,468,976	626,279											
21	Maine	2014	1,274,923	223,196											
22	Maryland	2014	5,296,486	1,399,498											
23	Massachusetts	2014	6,349,097	1,348,044											
24	Michigan	2014	9,938,444	1,014,215											
25	Minnesota	2014	4,919,479	1,195,975											
26	Mississippi	2014	2,844,658	163,633											
27	Missouri	2014	5,595,211	737,321											
28	Montana	2014	908,353	208,852											
29	Nebraska	2014	1,711,263	434,519											
30	Nevada	2014	1,998,257	454,379											
31	New Hampshire	2014	1,235,786	333,845											
32	New Jersey	2014	8,814,350	2,380,883											
33	New Mexico	2014	2,189,046	562,866											
34	North Dakota	2014	745,464	7,452,806											

- YOU CAN DELETE TO REMOVE FORMATTING

DEMO 2

- SELECT THE PRICE CHECKER

	A	B	C	D	E	F	G	H	
1		XSmall	Small	Medium	Large	XLarge			
2	Socks	\$4.00	\$4.25	\$4.50	\$4.75	\$5.00			
3	Shorts	\$12.00	\$12.50	\$13.00	\$13.50	\$14.00			
4	Pants	\$24.00	\$25.00	\$26.00	\$27.00	\$28.00			
5	T-Shirt	\$15.00	\$15.50	\$16.00	\$16.50	\$17.00			
6	Sweater	\$30.00	\$31.00	\$32.00	\$33.00	\$34.00			
7									
8									
9	Product:	Size:							
10	Pants	Small	=						
11									
12									
13									

Product: Pants Size: Small Price: \$25.00

- SELECT THE DATA, GOTO HOME, CONDITIONAL FORMATTING, NEW RULE, USE FORMULA TO DETERMINE WHICH CELL TO FORMAT
- $=\$C\$3=\$E\10

	XSmall	Small	Medium	Large	XLarge
Socks	\$4.00	\$4.25	\$4.50	\$4.75	\$5.00
Shorts	\$12.00	\$12.50	\$13.00	\$13.50	\$14.00
Pants	\$24.00	\$25.00	\$26.00	\$27.00	\$28.00
T-Shirt	\$15.00	\$15.50	\$16.00	\$16.50	\$17.00
Sweater	\$30.00	\$31.00	\$32.00	\$33.00	\$34.00

Product: Size: Price
Pants Small = **\$25.00**

New Formatting Rule

Style: Classic

Use a formula to determine which cells to format
=\$C\$3=\$E\$10

Format with Light Red Fill with Dark Red Text AaBbCcYyZz

Cancel OK

- SELECT YELLOW COLOR AND BOLD

	XSmall	Small	Medium	Large	XLarge
Socks	\$4.00	\$4.25	\$4.50	\$4.75	\$5.00
Shorts	\$12.00	\$12.50	\$13.00	\$13.50	\$14.00
Pants	\$24.00	\$25.00	\$26.00	\$27.00	\$28.00
T-Shirt	\$15.00	\$15.50	\$16.00	\$16.50	\$17.00
Sweater	\$30.00	\$31.00	\$32.00	\$33.00	\$34.00

Product: Size: Price
Socks XSmall = **\$4.00**

- NEXT EDIT THE RULE -> MANAGE RULE
- REMOVE THE \$
- =c3=\$E\$10

DEMO 3

- GO BACK TO STATE DATA
- SELECT TOTAL POPULATION -> START with C2

	A	B	C	D
0	Louisiana	2014	4,468,976	626,279
1	Maine	2014	1,274,924	223,196
2	Maryland	2014	5,296,486	1,399,498
3	Massachusetts	2014	6,349,097	1,348,044
4	Michigan	2014	9,938,444	1,014,215
5	Minnesota	2014	4,919,479	1,195,975
6	Mississippi	2014	2,844,658	163,633
7	Missouri	2014	5,595,211	737,321
8	Montana	2014	902,195	208,952
9	Nebraska	2014	1,711,263	433,519
0	Nevada	2014	1,998,257	454,379
1	New Hampshire	2014	1,235,786	333,845
2	New Jersey	2014	8,414,250	2,380,882
3	New Mexico	2014	1,819,046	562,866
4	New York	2014	18,976,457	3,423,896
5	North Carolina	2014	8,049,313	1,305,166

- Click conditional formatting
- $=\$C2>5000000$

The screenshot shows the 'Conditional Formatting' dialog box in Excel. The formula $=C2>5000000$ is entered in the 'Use a formula to determine which cells to format' field. The 'Format with' dropdown is set to 'Custom Format...' and displays the format code `AaBbCcYyZz`. The 'OK' button is highlighted.

- Add a new rules same process
- $=\$C2=\text{MAX}(\$C:\$C)$ (GET THE MAX VALUE) add border

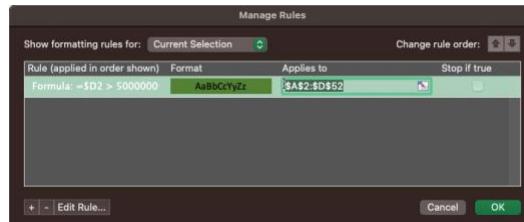
The screenshot shows the 'Conditional Formatting' dialog box in Excel. The formula $=C2=\text{MAX}(\$C:\$C)$ is entered in the 'Use a formula to determine which cells to format' field. The 'Format with' dropdown is set to 'Custom Format...' and displays the format code `AaBbCcYyZz`. The 'OK' button is highlighted.

- Select the whole row from A-D
- $=\$c2>5000000$

A	B	C	D	E
Alabama	2014	4,447,100	948,435	
Alaska	2014			
Arizona	2014			
Arkansas	2014			
California	2014			
Colorado	2014			
Connecticut	2014			
D.C.	2014			
Delaware	2014			
Florida	2014	15,982,378	2,563,588	
Georgia	2014	8,186,453	424,631	
Hawaii	2014	1,211,537	350,042	
Idaho	2014	1,293,953	77,163	
Illinois	2014	12,419,293	1,493,403	
		6,000,405	935,640	

A	B	C	D	E
Alabama	2014	4,447,100	948,435	
Alaska	2014	626,932	67,229	
Arizona	2014	5,130,632	1,396,669	
Arkansas	2014	2,673,400	257,943	
California	2014	33,871,648	8,492,127	
Colorado	2014	4,301,261	1,226,556	
Connecticut	2014	3,405,565	870,963	
D.C.	2014	783,600	166,161	
Delaware	2014	572,059	74,619	
Florida	2014	15,982,378	2,563,588	
Georgia	2014	8,186,453	424,631	
Hawaii	2014	1,211,537	350,042	
Idaho	2014	1,293,953	77,163	
Illinois	2014	12,419,293	1,493,403	
		6,000,405	935,640	

- TRY TO CHECK LARGEST STUDENT POPULATION
- EDIT THE RULE
- CHANGE IT TO \$D2



- GET THE RATIO -> =(\$D2/\$C2)>.25

A	B	C	D	E
Alabama	2014	4,447,100	948,435	
Alaska	2014	626,932	67,229	
Arizona	2014	5,130,632	1,396,669	
Arkansas	2014	2,673,400	257,943	
California	2014	22,971,649	9,127,127	
Colorado				
Connecticut				
D.C.				
Delaware				
Florida				
Georgia				
Hawaii				
Idaho	2014	1,293,953	77,163	
Illinois	2014	12,419,293	1,493,403	
		6,000,405	935,640	

	A	B	C	D	E
2	Alabama	2014	4,447,100	948,435	
3	Alaska	2014	626,932	67,229	
4	Arizona	2014	5,130,632	1,396,669	
5	Arkansas	2014	2,673,400	257,943	
6	California	2014	33,871,648	8,492,127	
7	Colorado	2014	4,301,261	1,226,556	
8	Connecticut	2014	3,405,565	870,963	
9	D.C.	2014	783,600	166,161	
10	Delaware	2014	572,059	74,619	
11	Florida	2014	15,982,378	2,563,588	
12	Georgia	2014	8,186,453	424,631	
13	Hawaii	2014	1,211,537	350,042	
14	Idaho	2014	1,293,953	77,163	
15	Illinois	2014	12,419,293	1,493,403	
16			6,000,405	925,640	

- ADD A COL STUDENT POPULATION %
- =D2/C2

Student Population		STUDENT POP %
948,435		21%
67,229		

DEMO 4

- HIGHLIGHT LETTER
- $=LEFT($A2,1)="I"$

The screenshot shows a Microsoft Excel spreadsheet titled "HJT_DEMO_MODULE7". The data is organized into columns: State, Year, Total Population, and Student Population. Row 14, which contains the state "Idaho", has its background color changed to red. A tooltip or a floating window titled "Edit Formatting Rule" is open over cell A14, showing the formula $=LEFT($A2,1)="I"$. The "Format with" dropdown is set to "Custom Format..." and "Add to style Z2". The "Style" dropdown is set to "Classic". The background of the entire row 14 is red.

- \$A\$2:\$D\$52

The screenshot shows the "Manage Rules" dialog box in Microsoft Excel. It lists one rule for the range \$A\$2:\$D\$52. The formula is $=LEFT($A2,1)="I"$ and the "Applies to" range is \$A\$2:\$D\$52. The "Format" is set to "Add to style Z2". A red arrow points from the formula field to the "Applies to" field. The background of the cells in row 14 (Idaho through Iowa) is red.

- INSERT LOGICAL OPERATORS
- STARTS WITH AN "I" AND ENDS WITH AN "a"
- $=AND(LEFT($A2,1)="I", RIGHT($A2,1)="a")$

Screenshot of Microsoft Excel showing the 'Edit Formatting Rule' dialog box open over a table of US state data.

Table Data:

	A	B	C	D	E	F	G
2	Alabama	2014	4,447,100	948,435			
3	Alaska	2014	626,932	67,229			
4	Arizona	2014					
5	Arkansas	2014					
6	California	2014					
7	Colorado	2014					
8	Connecticut	2014					
9	D.C.	2014					
10	Delaware	2014					
11	Florida	2014					
12	Georgia	2014					
13	Hawaii	2014	1,211,537	350,042			
14	Idaho	2014	1,293,953	77,163			
15	Illinois	2014	12,419,293	1,493,403			
16	Indiana	2014	6,080,485	935,649			
17	Iowa	2014	2,926,324	282,183			
18	Kansas	2014	2,688,418	520,793			
19	Kentucky	2014	4,041,769	1,180,743			
20	Louisiana	2014	4,468,976	626,279			

Edit Formatting Rule Dialog Box:

- Style: Classic
- Use a formula to determine which cells to format: `=AND(LEFT($A2,1)="I",RIGHT($A2,1)="a")`
- Format with: Custom Format... AaBbCcYyZz

Screenshot of Microsoft Excel showing the same table of US state data, but with a different column header arrangement and some cells highlighted.

Table Data:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	State	Year	Total Population	Student Population											
2	Alabama	2014	4,447,100	948,435											
3	Alaska	2014	626,932	67,229											
4	Arizona	2014	5,130,632	1,396,669											
5	Arkansas	2014	2,673,400	257,943											
6	California	2014	33,871,648	8,492,127											
7	Colorado	2014	4,301,261	1,226,556											
8	Connecticut	2014	3,405,565	870,963											
9	D.C.	2014	783,600	166,161											
10	Delaware	2014	572,059	74,619											
11	Florida	2014	15,982,378	2,563,588											
12	Georgia	2014	8,186,453	424,631											
13	Hawaii	2014	1,211,537	350,042											
14	Idaho	2014	1,293,953	77,163											
15	Illinois	2014	12,419,293	1,493,403											
16	Indiana	2014	6,080,485	935,649											
17	Iowa	2014	2,926,324	282,183											
18	Kansas	2014	2,688,418	520,793											
19	Kentucky	2014	4,041,769	1,180,743											
20	Louisiana	2014	4,468,976	626,279											
21	Maine	2014	1,274,923	223,196											
22	Maryland	2014	5,296,486	1,399,498											
23	Massachusetts	2014	6,349,097	1,348,044											

Module 8 - Array

Topics:

1. RULES OF ARRAY FORMULA
2. VERTICAL / HORIZONTAL

Objectives:

At the end of the module the participant is expected to:

1. Understand and apply the different ARRAY functions:
 - a. RULES OF ARRAY FORMULA
 - b. VERTICAL / HORIZONTAL

ARRAY FUNCTIONS

Array functions perform multiple calculations on one or more items in an array, and can take the form of either a single-cell formula (which exists within one cell) or a multi-cell formula (which can be applied to a number of cells and return multiple results)

You must press **CTRL-SHIFT-ENTER** to enter, edit, or delete an array formula; this automatically adds brackets “{ }” to indicate that the function applies to an array

	A	B	C	D
1	Name	Earnings	Units	
2	Tim	\$4,500	4	\$18,000
3	George	\$3,250	2	
4	Lisa	\$3,725	3	
5	Zach	\$4,150	5	

If you select D2:D5, type “=B2:B5*C2:C5” and hit ENTER, the formula will only be applied to cell D2

	A	B	C	D
1	Name	Earnings	Units	
2	Tim	\$4,500	4	\$18,000
3	George	\$3,250	2	\$6,500
4	Lisa	\$3,725	3	\$11,175
5	Zach	\$4,150	5	\$20,750

If you select D2:D5, type “=B2:B5 * C2:C5” and hit CTRL-SHIFT-ENTER, you have created an array formula applied to all cells in the range

RULES

When you work with **array functions**, you must obey the following rules:



1. You must press **CTRL-SHIFT-ENTER (C-S-E)** to edit or enter an array formula
2. For multi-cell array functions, you must select the range of cells before entering the formula
3. You cannot change the contents of any individual cell which is part of an array formula
4. You can move or delete an entire array formula, but not a piece of it (so you often have to delete and rebuild)
5. You cannot insert blank cells into or delete cells from a multi-cell array formula

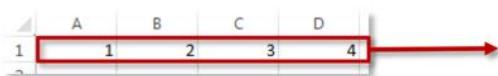
PROS AND CONS

Array functions can be incredibly powerful, but also a total buzzkill to work with; here are some of the key pros and cons of using them:

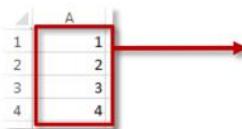
PROS	CONS
<ul style="list-style-type: none">-Condenses multiple calculations into one formula, often reducing file size-Can perform some complex functions that non-array formulas cannot-Reduces the risk of human error such as accidentally deleting parts of arrays or mistyping formulas	<ul style="list-style-type: none">-Can be very difficult to modify or delete existing array formulas<i>-Limited visibility into the formula's function,</i> especially for users who are not familiar with arrays-Eliminates the option to modify cells contained within arrays-May reduce processing speed if multiple array functions are used

ARRAY CONSTANT

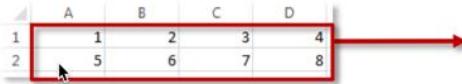
Array constants are created by manually entering a list of items directly into the formula bar and manually surrounding the list with brackets (`{ }`)



Horizontal **array constants** create an array contained within a single row, and are delimited by commas (i.e. Select A1:D1, type “`={1,2,3,4}`” then hit C-S-E)



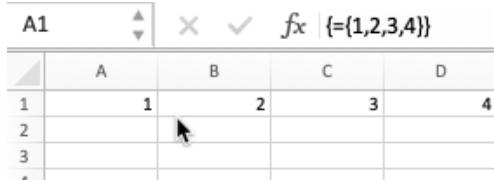
Vertical **array constants** create an array contained within a single column, and are delimited by semicolons (i.e. Select A1:A4, type “`={1;2;3;4}`” then hit C-S-E)



Two-dimensional **array constants** create an array contained across multiple rows and columns (i.e. Select A1:D2, type “`={1,2,3,4;5,6,7,8}`” then hit C-S-E)

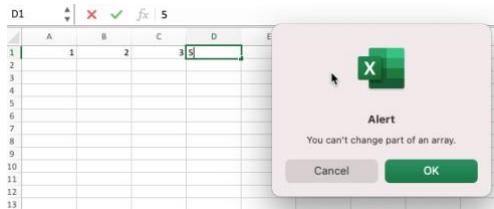
Example

- SELECT A-D 9 (Horizontal Array)
- In the formula bar type ={1,2,3,4} then CSE.



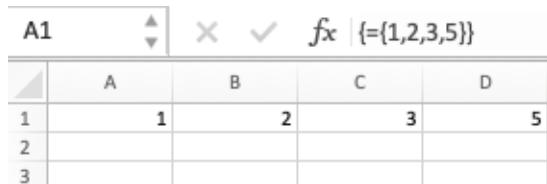
A screenshot of Microsoft Excel showing a horizontal array. The formula bar at the top displays "A1" and "{=1,2,3,4}" with a green checkmark icon. Below the formula bar is a grid of four columns labeled A, B, C, and D, and three rows labeled 1, 2, and 3. The cell A1 contains the value 1, B1 contains 2, C1 contains 3, and D1 contains 4. The cell A1 is currently selected, indicated by a black border around it.

- If you change the value, you cannot edit it, you cannot also change the value in the formula bar



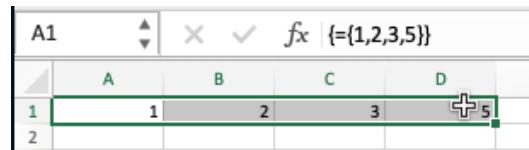
A screenshot of Microsoft Excel showing an attempt to edit a cell in a horizontal array. The formula bar at the top displays "D1" and "5" with a green checkmark icon. The grid shows cells A1:D1 with values 1, 2, 3, and 5 respectively. The cell D1 is currently selected. An alert dialog box titled "Alert" appears, stating "You can't change part of an array." with "Cancel" and "OK" buttons. This indicates that individual cells within a horizontal array cannot be edited directly.

- Select the array, update the value in the formula bar the CSE



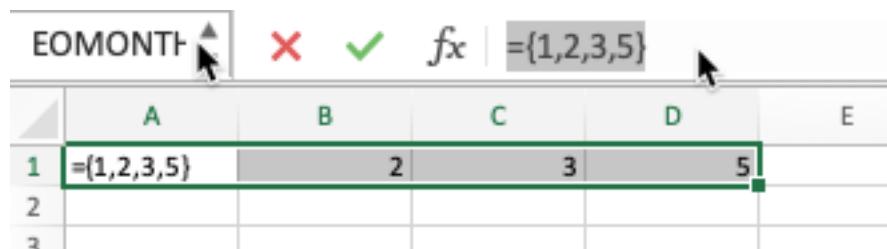
A screenshot of Microsoft Excel showing a horizontal array. The formula bar at the top displays "A1" and "{=1,2,3,5}" with a green checkmark icon. Below the formula bar is a grid of four columns labeled A, B, C, and D, and three rows labeled 1, 2, and 3. The cell A1 contains the value 1, B1 contains 2, C1 contains 3, and D1 contains 5. The cell A1 is currently selected.

- To delete select the entire array then press delete.



A screenshot of Microsoft Excel showing the entire horizontal array selected for deletion. The formula bar at the top displays "A1" and "{=1,2,3,5}" with a green checkmark icon. The grid shows cells A1:D1 with values 1, 2, 3, and 5 respectively. All four cells (A1, B1, C1, D1) are highlighted with a thick green selection border, indicating they are selected for deletion.

- Another way is to select the formula bar (delete the formula) CSE,



A screenshot of Microsoft Excel showing the formula bar selected for deletion. The formula bar at the top displays "EOMONTH" and "{=1,2,3,5}" with a red X icon. The formula bar is highlighted with a green selection border. The grid below shows cells A1:D1 with values 1, 2, 3, and 5 respectively. The formula bar is the only part of the interface that is visible, indicating it has been selected for deletion.

- Vertical Array
- SELECT A then 1-4. (USE ; to separate the data)
- $\{1;2;3;4\}$

A1 $\{1;2;3;4\}$

	A	B	C	D
1	1			
2	2			
3	3			
4	4			
5				
6				

- Two dim array
- SELECT AB-4
- $\{1,2;3,4;5,6;7,8\}$

	A	B
1	1	2
2	3	4
3	5	6
4	7	8
5		
6		

ARRAY CONSTANT IN FORMULA

Array constants can contain values, text (surrounded by “ ”), logical values (TRUE, FALSE), or error values (#N/A), and can be used as part of an array formula

This function takes each value in the array A1:A5 and multiplies it against the corresponding value in the array constant {1;2;3;4;5}, which essentially translates into the following formula: $=\text{SUM}(A1*1, A2*2, A3*3, A4*4, A5*5)$

PRO TIP:

You manually add the brackets when you type array constants, but the additional brackets surrounding the entire formula are automatically added once you press C-S-E

Example

- Type the following manually

9	1	10	10
10	2	20	40
11	3	30	90
12	4	40	160
13	5	50	250

- Vertical Array

• A-1-5. ={1;2;3;4;5} -CSE

A1	A	B	C	D
1	1			
2	2			
3	3			
4	4			
5	5			
6				
7				

- SELECT B1-B5, a1-a5

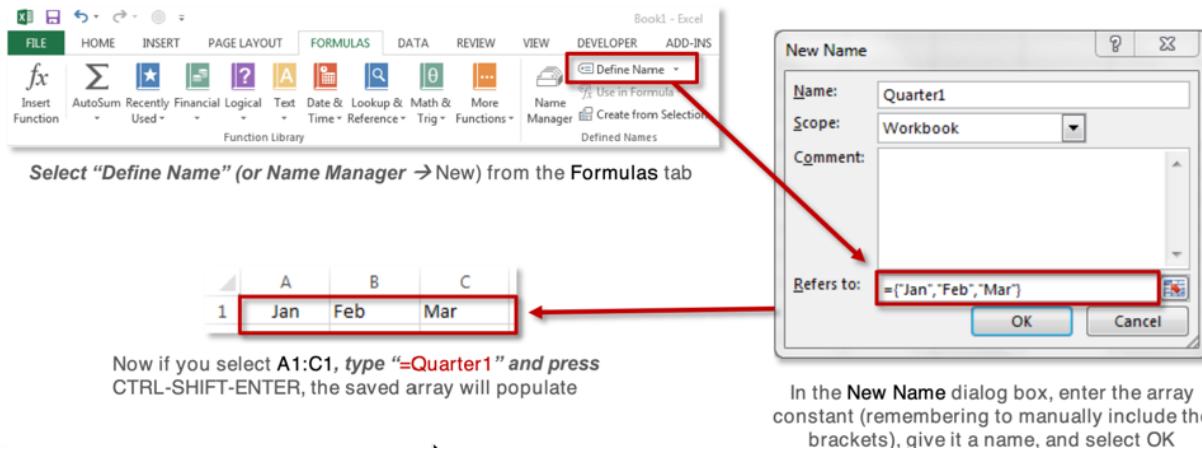
• =A1:A5*{10;20;30;40;50} - CSE

MATCH		C	D	E	F	A	B
1						1	10
2						2	40
3						3	90
4						4	160
5						5	250
6							

The formula bar shows =A1:A5*{10;20;30;40;50}. The range A1:A5 is selected, and the formula is being entered.

NAMED ARRAY

Just like normal cell ranges, **array constants** can be assigned a name using Excel's name manager, which can make them much easier to work with

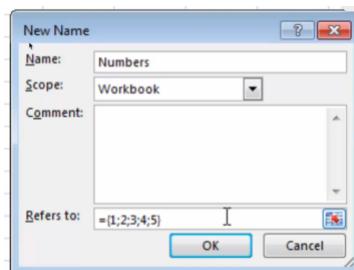


Example

- SAMPLE, create a vertical array
- $\{1;2;3;4;5\}$

A1	B	C	D	E
1				
2				
3				
4				
5				

- Define a name
- GOTO FORMULA TABLE
- SELECT DEFINE NAME



- SELECT B1-B5, goto formula bar then select numbers -> CSE

The screenshot shows the Excel interface with the formula bar at the top. The formula bar has the text '=Num' selected. A context menu is open over cell B1, with the 'Numbers' option highlighted under the 'Named Ranges' section. The main worksheet area shows two rows of data: one row where column A contains values 1 through 5 and column B contains the same values, and another row where column A contains values 1 through 5 and column B contains the text 'One' through 'Five' respectively.

- Define new
- ={"One";"Two";"Three";"Four";"Five"}

The screenshot shows the 'New Name' dialog box open in the foreground. It has 'Text' in the 'Name:' field and 'Workbook' in the 'Scope:' dropdown. The 'Refers to:' field contains the formula '= {"One"; "Two"; "Three"; "Four"; "Five"}'. In the background, the worksheet shows two rows of data. The first row has values 1 through 5 in columns A and B. The second row has text 'One' through 'Five' in column C. Cell C1 is currently selected.

- Press CSE

The screenshot shows the formula bar with the formula '=A7:A11*Numbers' selected. The range A7:A11 is highlighted with a green border. The main worksheet area shows three rows of data. The first row has values 6, 7, 8, 9, and 10 in columns D and E. The second row has text 'One', 'Two', 'Three', 'Four', and 'Five' in column C. The third row has values 6, 12, 24, 14, and 20 in columns D and E.

TRANSPOSE

The **TRANSPOSE** function allows you to change the orientation of a given data array (i.e. from 5 rows x 2 columns to 2 rows x 5 columns)

NOTE: The range in which you enter a **TRANSPOSE** function must be the exact dimensions of the transposed data

{=TRANSPOSE(array)}

A	B	C	D	E	
3	20	125			
4	15	150			
5	25	120			
6	20	115			
7	15	140			
8					
9	20	15	25	20	15
10	125	150	120	115	140

Select A9:E10, type “**=TRANSPOSE(A3:B7)**” and press CTRL-SHIFT-ENTER to copy the transposed data

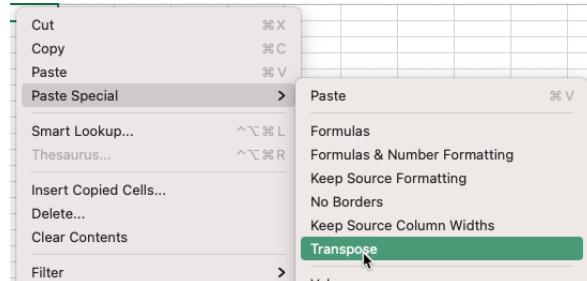


PRO TIP:

To transpose a data set that you may want to later edit, just use Paste Special → Transpose (ALT-H-V-T)

Example

- SALES DATA WORKBOOK
- SELECT the data,
- PRESS CONTROL + c
- PASTE IT



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Year	Store Location	Revenue	Spend	Profit	ROI											
2	2013	Boston	\$1,099	\$643	\$456	171%											
3	2014	Boston	\$1,204	\$720	\$484	167%											
4	2015	Boston	\$1,726	\$1,000	\$726	173%											
5	2013	New York	\$1,944	\$964	\$980	202%											
6	2014	New York	\$1,293	\$857	\$436	151%											
7	2015	New York	\$1,828	\$840	\$988	218%											
8	2013	Detroit	\$1,743	\$830	\$913	210%											
9	2014	Detroit	\$1,609	\$910	\$699	177%											
10	2015	Detroit	\$1,494	\$909	\$585	164%											
11																	
12																	
13																	

Should be same dimension 10x6

I8										{=TRANSPOSE(A1:F10)}									
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	Year	Store Location	Revenue	Spend	Profit	ROI			Year	2013	2014	2015	2013	2014	2015	2013	2014	2015	
2	2013	Boston	\$1,099	\$643	\$456	171%			Store Location	Boston	Boston	Boston	New York	New York	New York	Detroit	Detroit	Detroit	
3	2014	Boston	\$1,204	\$720	\$484	167%			Revenue	\$1,099	\$1,204	\$1,726	\$1,944	\$1,293	\$1,828	\$1,743	\$1,609	\$1,494	
4	2015	Boston	\$1,726	\$1,000	\$726	173%			Spend	\$643	\$720	\$1,000	\$964	\$857	\$840	\$830	\$910	\$909	
5	2013	New York	\$1,944	\$964	\$980	202%			Profit	\$456	\$484	\$726	\$980	\$436	\$988	\$913	\$699	\$585	
6	2014	New York	\$1,293	\$857	\$436	151%			ROI	171%	167%	173%	202%	151%	218%	210%	177%	164%	
7	2015	New York	\$1,828	\$840	\$988	218%			Year	2013	2014	2015	2013	2014	2015	2013	2014	2015	
8	2013	Detroit	\$1,743	\$830	\$913	210%			Store Location	Boston	Boston	Boston	New York	New York	New York	Detroit	Detroit	Detroit	
9	2014	Detroit	\$1,609	\$910	\$699	177%			Revenue	1099	1204	1726	1944	1293	1828	1743	1609	1494	
10	2015	Detroit	\$1,494	\$909	\$585	164%			Spend	643	720	1000	964	857	840	830	910	909	
11									Profit	456	484	726	980	436	988	913	699	585	
12									ROI	1.709176	1.672222	1.726	2.016598	1.508751	2.17619	2.1	1.768132	1.643564	
13																			
14																			

- Get the formatting after
- Demo 2
- LINKING SHEETS
- Duplicate the values to another sheet
- non array
- ='Sales Data'!E10
- array
- ='Sales Data'!A1:F10 don't forget the CSE