

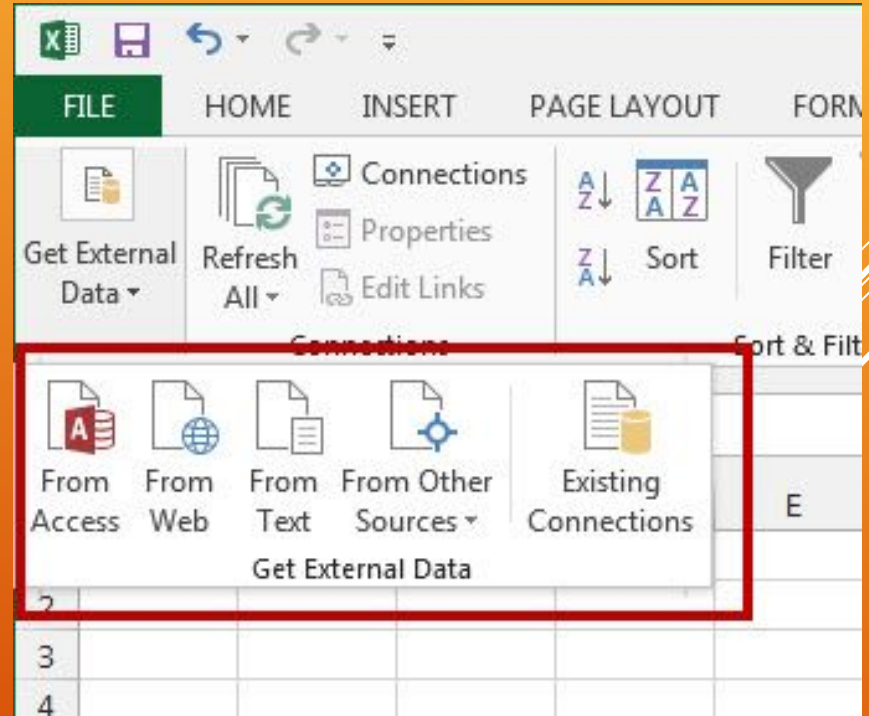
# Excel for Analytics



# EXCEL- Reading Data

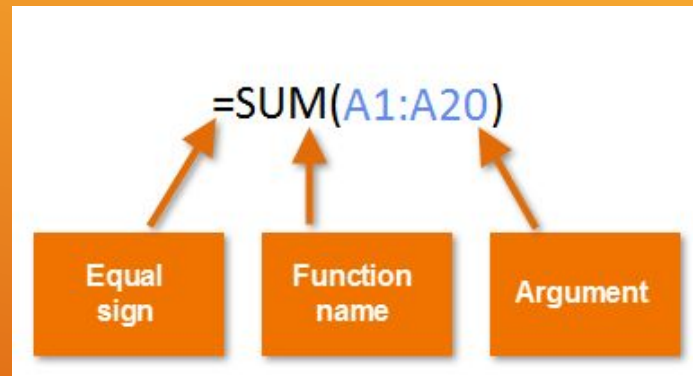
## Reading Data into Excel using various format

- Regular Excel Format(.xlsx,.xls)
- Text Format(.txt)



# EXCEL- Predefined functions

- ROUND(): returns a number rounded to a specified number of digits
- SQRT(): returns square root of a number
- MIN()/MAX(): returns the smallest/largest numeric value in a range of values
- SUM(): returns the sum of a range of values
- AVERAGE(): returns the average or mean value of a range of values
- MEDIAN(): returns the median value of a range of values
- RANK(): used to find the rank of a number in a list of numbers
- LEFT()/RIGHT(): extracts a given number of characters from the left side/right side of a supplied text string
- LEN(): used to find the length of a text string



# EXCEL- Advanced Functions

## DateTime

- DATE(): creates a valid date from individual year, month, and day components
- EOMONTH(): Returns the serial number for the last day of the month that is the indicated number of months before or after start date
- NETWORKDAYS(): calculates the number of workdays between two dates in Excel
- WEEKDAY(): returns a number between 1-7 representing the day of week.

DATE()

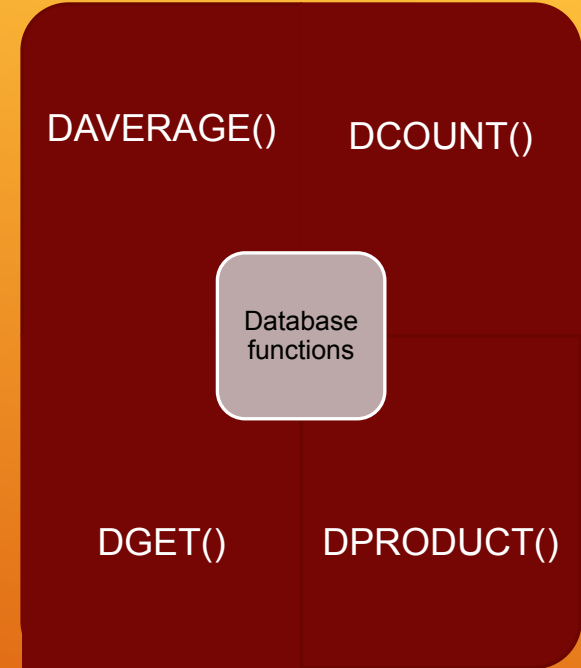
WEEKDAY()

EOMONTH()

NETWORKDAYS()

## Database Functions

- DAVERAGE(): calculates an average for values in an Excel list
- DCOUNT(): counts matching records in a database using criteria and an optional field
- DGET(): extracts a single value from a column of a list or database that matches specified conditions
- DPRODUCT(): returns the product of values from a set of records that match criteria



# EXCEL- Advanced Functions

## Text Functions

- FIND(): returns the location of a substring in a string
- REPLACE(): replaces characters specified by location in a given text string with another text string
- SUBSTITUTE(): replaces text in a given string by matching
- MID(): extracts a given number of characters from the middle of a supplied text string
- SEARCH(): used to find the position of a character inside a text string
- CONCAT(): used to join two or more text strings into one string

FIND()

REPLACE()

SUBSTITUTE()

MID()

SEARCH()

CONCATENATE()

# EXCEL- Advanced Functions

## Mathematical Functions

- ❑ **PRODUCT():** returns the product of numbers provided as arguments  
`=PRODUCT (number1, [number2], ...)`
- ❑ **MOD():** returns the remainder of two numbers after division  
`=MOD (number, divisor)`
- ❑ **SQRT():** returns the square root of a positive number  
`=SQRT (number)`
- ❑ **FACT():** returns the factorial of a given number
- ❑ **ROUNDUP()/ROUNDDOWN():** round the number upward/downward to the specified number of digits  
`=ROUNDUP (number, num_digits)`
- ❑ **SUMIFS():** adds all of its arguments that meet multiple criteria  
`=SUMIFS (sum_range, range1, criteria1, [range2], [criteria2], ...)`

PRODUCT()

MOD()

SQRT()

FACT()

ROUNDUP()

ROUNDDOWN()

SUMIFS()

# EXCEL- Advanced Functions

## Lookup Functions

**HLOOKUP** and **VLOOKUP** are functions in Microsoft Excel that allow you to use a section of your spreadsheet as a lookup table.

When the VLOOKUP function is called, Excel searches for a lookup value in the leftmost column of a section of your spreadsheet called the table array. The function returns another value in the same row, defined by the column index number.

HLOOKUP is similar to VLOOKUP, but searches a row instead of a column, and the result is offset by a row index number. The V in VLOOKUP stands for vertical search (in a single column), while the H in HLOOKUP stands for horizontal search (within a single row).



# EXCEL- Advanced Functions

## Lookup Functions

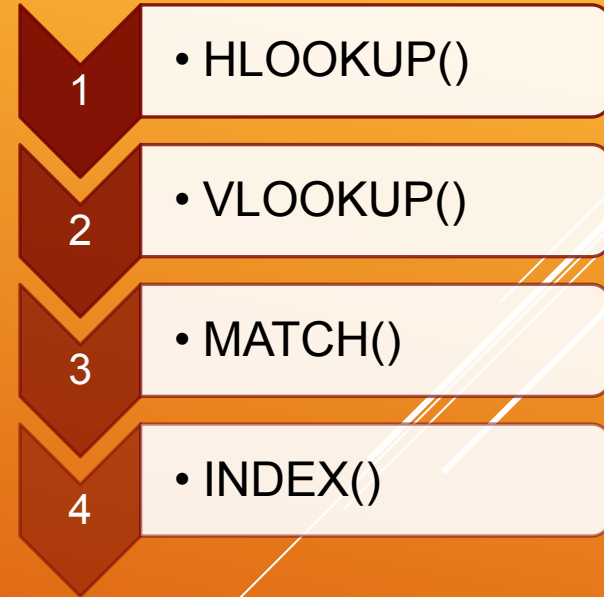
- HLOOKUP(): makes Excel search for a certain value in a row (the so called 'table array')

=HLOOKUP("Axles", A1:C4, 2, TRUE)

Looks up "Axles" in row 1, and returns the value from row 2 that's in the same column (column A)

Result: 4

- VLOOKUP(): =VLOOKUP(What you want to look up, where you want to look for it, the column number in the range containing the value to return, Approximate or Exact match – indicated as 1/TRUE, or 0/FALSE)
- MATCH(): used to locate the position of a lookup value in a row, column, or table  
=MATCH (lookup\_value, lookup\_array, [match\_type])
- INDEX(): returns the value at a given location in a range or array  
=INDEX (array, row\_num, [col\_num], [area\_num])



# EXCEL- Advanced Functions

## Logical and Error Functions

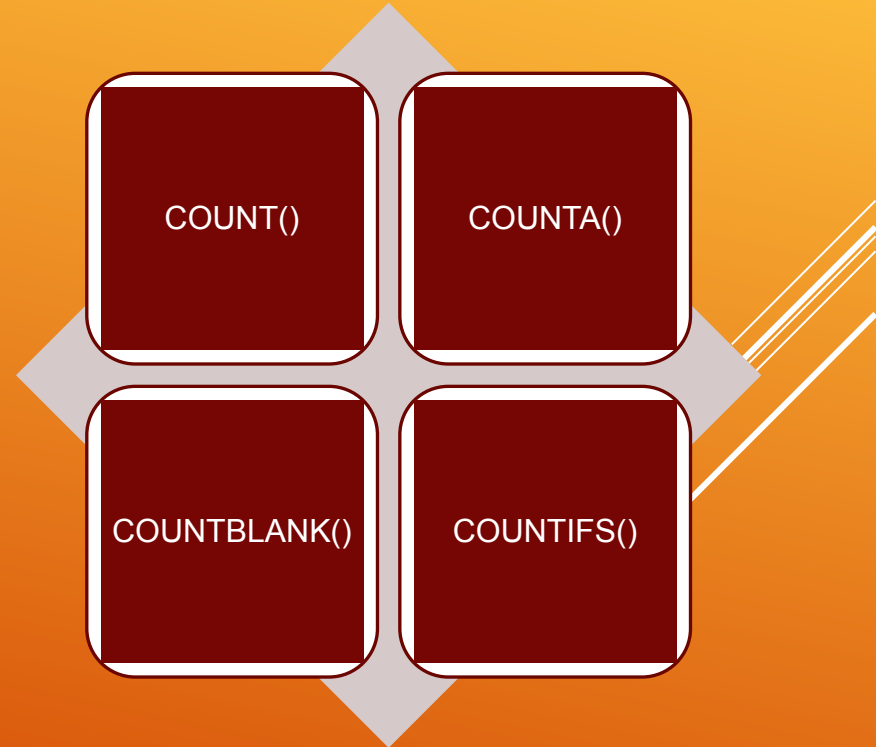
- AND: used to require more than one condition at the same time
- OR: a logical function to test multiple conditions at the same time
- NOT: The function helps check if one value is not equal to another
- ISERROR: returns TRUE for any error type excel generates, including #N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL
- ISNUMBER: The function checks if a cell in Excel contains a number or not. It will return TRUE if the value is a number and if not, a FALSE value
- ISBLANK: returns TRUE when a cell contains is empty, and FALSE when a cell is not empty
- IF: Test for a specific condition. =IF (logical\_test, [value\_if\_true], [value\_if\_false])
- IFERROR: returns a custom result when a formula generates an error, and a standard result when no error is detected



# EXCEL- Advanced Functions

## Statistical Functions

- COUNT(): to get the number of entries in a number field that is in a range or array of numbers
- COUNTA(): returns the count of cells that contain numbers, text, logical values, error values, and empty text (""). COUNTA does not count empty cells
- COUNTBLANK(): returns a count of empty cells in a range
- COUNTIFS(): counts the number of cells in a range that match one supplied criteria



# Statistical Functions

- MEAN: Get the average of a group of numbers.  
Syntax = AVERAGE (number1, [number2], ...)
- MEDIAN(): Get the median of a group of numbers. Syntax = AVERAGE (number1, [number2], ...)
- MODE(): returns the most frequently occurring number in a numeric data set.
- CORREL: used to find out the correlation coefficient between two variables.  
CORREL(array1, array2)
- STDEV: returns the statistical rank of a given value within a supplied array of values

MEAN

MEDIAN()

MODE()

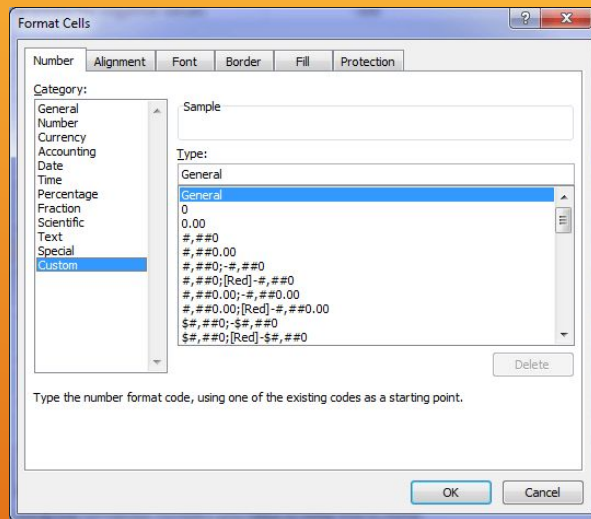
CORREL()

STDEV

# Formatting

Excel formatting is an optional step following data preparation, or all of the data cleansing, enriching, structuring, and standardizing that is required in order to prepare data for analysis.

For example, adding \$ to cells that contain values pertaining to prices or configuring cells that represent dates to a standard display of xx/xx/xxxx

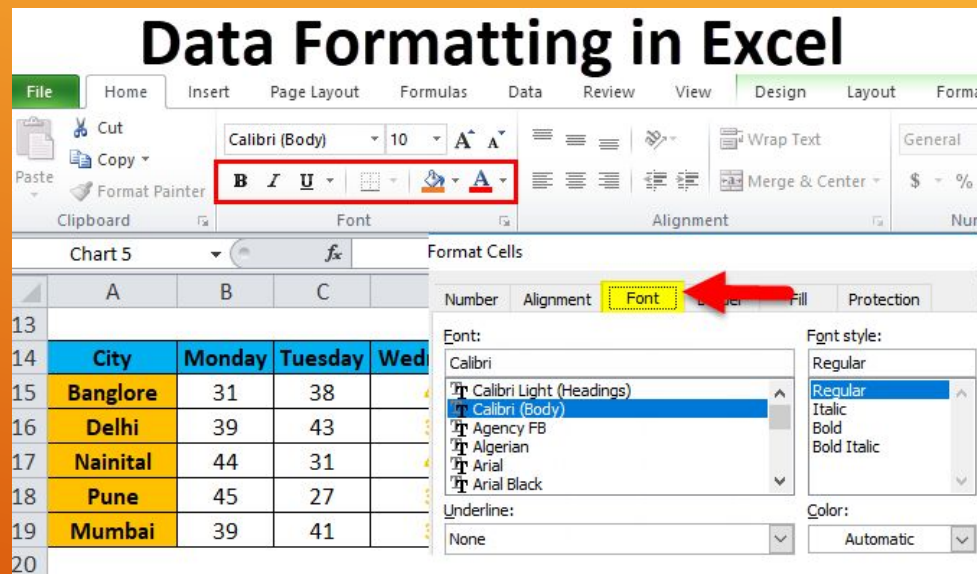
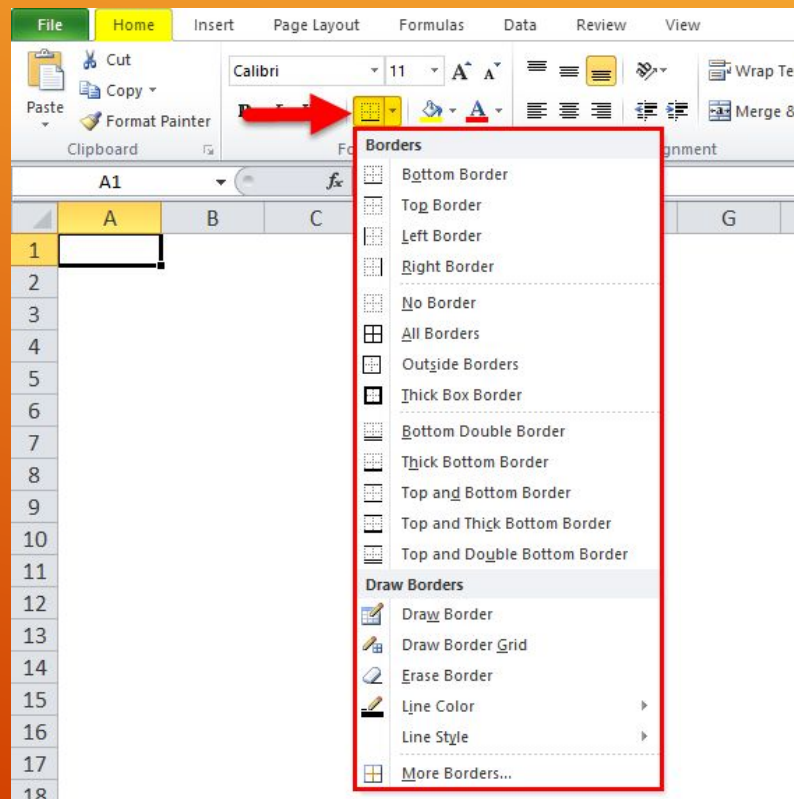


## Components of Format Cells

- ☐ Number
- ☐ Alignment
- ☐ Font
- ☐ Border
- ☐ Fill
- ☐ Protection

# Formatting

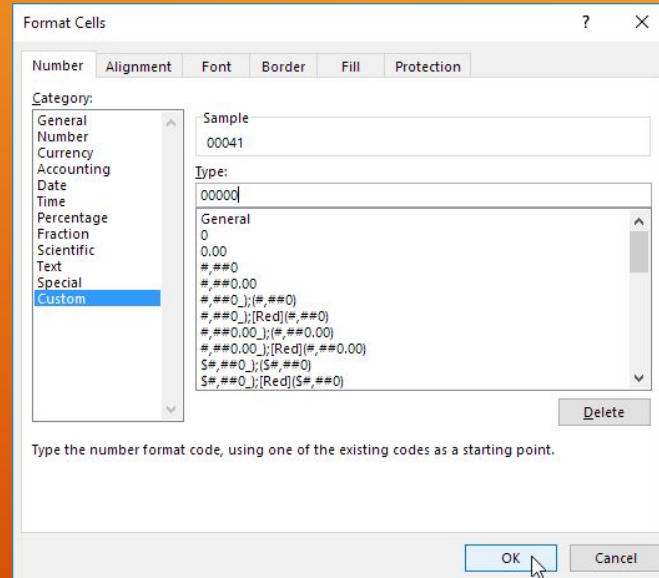
## Data Formatting



# Formatting

## Custom Formatting

Understand how to use Custom Formatting to format number and date values




# Formatting



## Conditional Formatting

Illustrate the use of conditional formatting in Excel

- Conditional formatting helps us visualize data and make worksheets easier to understand
  - It quickly highlights important information in a spreadsheet by using colors, icons, and data bars
  - It changes the appearance of one or more cells when cell values meet certain conditions
- 



# Formatting

## Conditional Formatting

Conditional Formatting

RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCreditCard
1	15634602	Hargrave	619	France	Female	42	2	0	1	
2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	
3	15619304	Onio	502	France	Female	42	8	159660.8	3	
4	15701354	Boni	699	France	Female	39	1	0	2	
5	15737888	Mitchell	850	Spain	Female	43	2	125510.8	1	1
6	15574012	Chu	645	Spain	Male	44	8	113755.8	2	1
7	15592531	Bartlett	822	France	Male	50	7	0	2	1
8	15656148	Obinna	376	Germany	Female	29	4	115046.7	4	1
9	15792365	He	501	France	Male	44	4	142051.1	2	0
10	15592389	H?	684	France	Male	27	2	134603.9	1	1
11	15767821	Bearce	528	France	Male	31	6	102016.7	2	0
12	15737173	Andrews	497	Spain	Male	24	3	0	2	1
13	15632264	Kay	476	France	Female	34	10	0	2	1
14	15691483	Chin	549	France	Female	25	5	0	2	0
15	15600882	Scott	635	Spain	Female	35	7	0	2	1
16	15643966	Goforth	616	Germany	Male	45	3	143129.4	2	0
17	15737452	Romeo	653	Germany	Male	58	1	132602.9	1	1
18	15788218	Henderso	549	Spain	Female	24	9	0	2	1
19	15661507	Muldrow	587	Spain	Male	45	6	0	1	0
20	15568982	Hao	726	France	Female	24	6	0	2	1

# Charts in Excel

## You'll learn these things:

- ❑ Inserting a Chart
- ❑ Adjusting a Chart
- ❑ Improving a Chart
- ❑ Add series to a chart
- ❑ Create Combination Charts

MS Excel

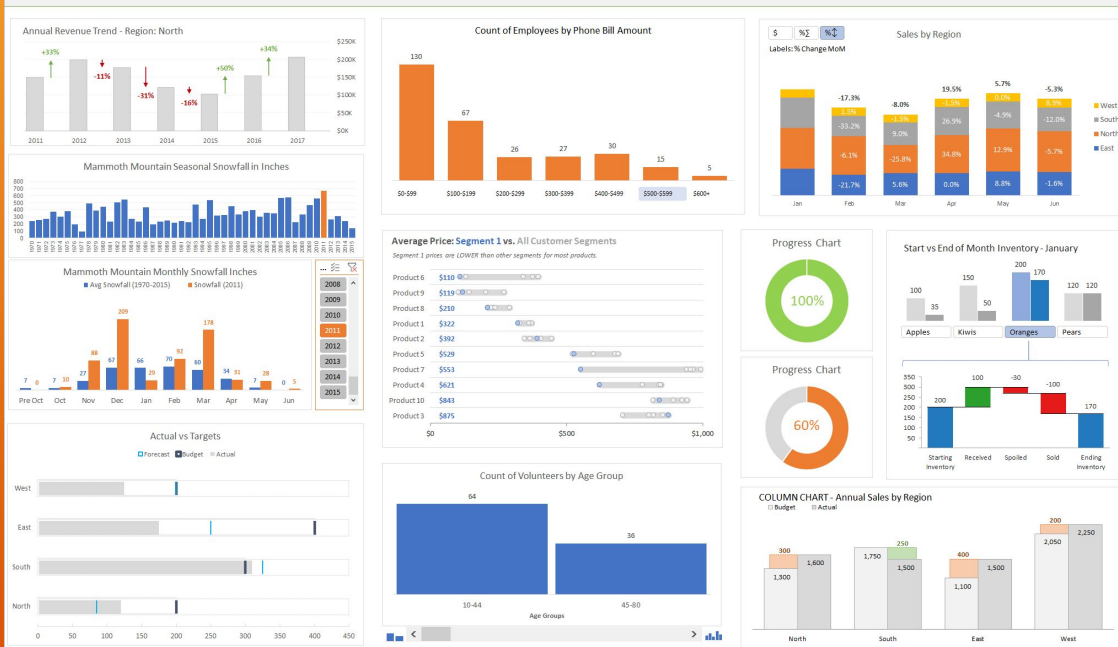
Excel Online

Google Sheets

All are in a way similar in nature

# Charts in Excel

## 10 Advanced Excel Charts



# Statistical Analysis using Excel



**Let's see how do we perform various statistical tests in Excel**

**First of all, is it possible to perform the same Statistical tests in Excel that we usually perform in Python**

**The answer is YES!!**



# Data Analysis using Excel

## Data Analysis Tool in Excel

File Home Analyze Insert Page Layout Formulas **Data** Review View Developer

**Data Analysis**

**Analysis Tools**

- Histogram
- Moving Average
- Random Number Generation
- Rank and Percentile
- Regression
- Sampling
- t-Test: Paired Two Sample for Means**
- t-Test: Two-Sample Assuming Equal Variances
- t-Test: Two-Sample Assuming Unequal Variances
- z-Test: Two Sample for Means

**Data Analysis Tools**

Tools for financial and scientific data analysis.

**FUNCRES**  
Press F1 for add-in help.

**Solver**

What-if analysis tool that finds the optimal value of a target cell by changing values in cells used to calculate the target cell.

**SOLVER**  
Press F1 for add-in help.

**Solver Parameters**

Set Objective:

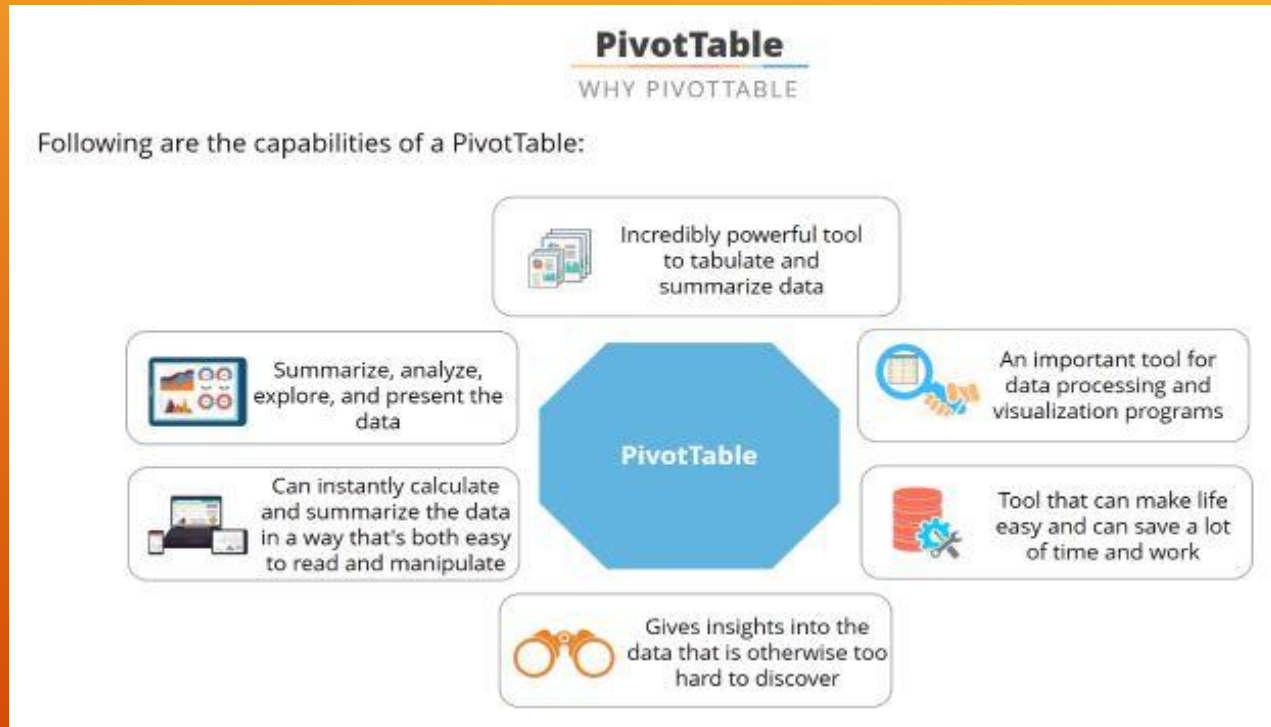
To: ☐ Max ☐ Min ☒ Value Of:

By Changing Variable Cells:

10	-1.066300497
9	9
8	0
7	-0.564706354
6	10
5	10

# Analysing Data with Pivot Tables

Doing a proper analysis of the available data helps companies make critical business decisions. But sometimes it's difficult to understand where to start, especially when the data is huge



# Analysing Data with Pivot Tables

## How it works...

One can design a PivotTable by simply, dragging and dropping relevant information into the appropriate boxes. This tool quickly pivots or reorganizes data allowing us to answer different questions and even experiment with the data to discover new trends and patterns

	B	C	D	E	F	G	H	I
1	Fruit	Price	Weight			Row Labels	Sum of Price	Sum of Weight
2	Apple	7.9	93			Apple		
3	Orange	2.9	57			11/1/2017	7.9	93
4	Plum	6.2	75			11/2/2017	1.9	78
5	Lychee	7.1	76			11/3/2017	6.7	98
6	Longan	8.4	73			11/4/2017	3.2	96
7	Apple	1.9	78			11/5/2017	6.3	95
8	Orange	6.1	59			Apple Total	26	460
9	Plum	7.6	73			Longan		
10	Lychee	5	54			11/1/2017	8.4	73
11	Longan	4.5	62			11/2/2017	4.5	62
12	Apple	6.7	98			11/3/2017	7	62
13	Orange	2.6	68			11/4/2017	8.3	79
14	Plum	7.1	93			11/5/2017	8.5	90
15	Lychee	0.4	81			Longan Total	36.7	366
16	Longan	7	62			Lychee		
17	Apple	3.2	96			11/1/2017	7.1	76



# Analysing Data with Pivot Tables

## Filters

A PivotTable helps to extract the important information from a large, detailed dataset. Sometimes, the focus is required on just a certain section of our data. Filters help us narrow down the data in the PivotTable, extracting the required information

The screenshot shows an Excel PivotTable and the PivotTable Field List task pane. The PivotTable is located in the range B4:H16 and has the following data:

Time	(All)
21 Apr 2012	1.2
22 Apr 2012	1.9
23 Apr 2012	4.4
24 Apr 2012	6.2
25 Apr 2012	4.6
26 Apr 2012	7.7
27 Apr 2012	8.3
28 Apr 2012	7.4
29 Apr 2012	5.1
30 Apr 2012	6.8
1 May 2012	11.4
(blank)	0
Grand Total	1.2

The PivotTable Field List on the right shows the following configuration:

- Choose fields to add to report:** Time (checked), Tx, Tn (checked), RH, Tdew, ff-mean.
- Drag fields between areas below:**
  - Report Filter:** Time
  - Column Labels:** (empty)
  - Row Labels:** ClimatDateMin
  - Values:** Min of Tn
- Defer Layout Update:** (unchecked)
- Update:** (button)

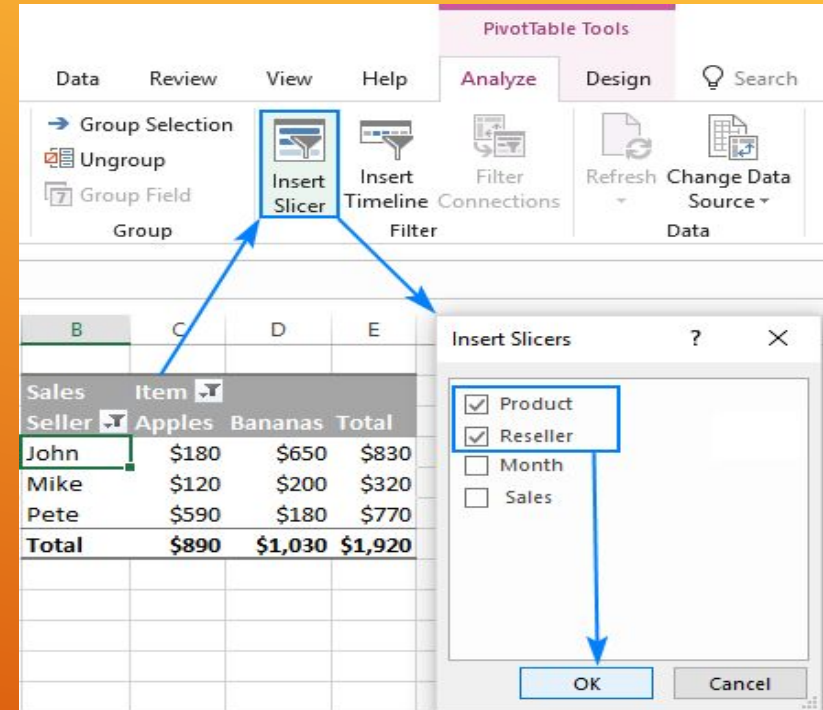
A red arrow points from the 'Time' field in the 'Report Filter' area to the 'Time' field in the 'Choose fields to add to report:' list.



# Analysing Data with Pivot Tables

## Slicers

Another important tool of Excel, Slicers, makes filtering data in PivotTables even easier. Slicers contain a set of buttons which make filtering data in PivotTables easier and quicker. We do not have to open the drop-down lists to find the items we want to filter. We can create slicers for any field and can filter a Pivot Table by selecting the type of data we want.



# Analysing Data with Pivot Tables

## Grouping

It is often useful to group the fields in a PivotTable by the header values.

Grouping data in a PivotTable allows us to group the data for any field added as a row or a column. Excel can do this automatically for numeric values (including dates and time).

Country	(All)
Row Labels	Sum of Order Amount
Amy Dodsworth	75048.04
7/15/2006	2490.5
7/31/2006	1873.8
10/10/2006	5275.71
10/21/2006	88.5
12/25/2006	166

List of dates before grouping

Country	(All)
Row Labels	Sum of Order Amount
Amy Dodsworth	75048.04
Qtr1	
Jan	6660.62
Feb	20418.34
Mar	5401.05
Qtr2	
Apr	10881.61
May	555.6
Jun	3482.5

List of dates grouped by quarters and months

# Analysing Data with Pivot Tables

## Custom Calculation

Sometimes, there is a need to change the way the values are displayed in the PivotTable.

The value can be displayed in terms of a percentage instead of a total or an average of the values instead of summing them

Table with Helper				Pivot Table is not in data model				
Category	Wise Order	Helper		Row Labels	Sum of Helper	Sum of Wise Order	Average of Wise Order	Sum of Average of Distinct
Agriculture	A	22	1	Agriculture	5	2	144	28.8
Non Core	A	23	1	NA	5	3	130	26
NA	A	24	1	Non Core	4	3	125	31.25
NA	B	25	1	Grand Total	#	8	399	28.5
NA	C	26	1					49.875
NA	B	27	0					
NA	C	28	0					
Agriculture	A	29	0					
Agriculture	A	30	0					
Agriculture	B	31	1					
Agriculture	B	32	0					
Non Core	C	33	1					
Non Core	C	34	0					
Non Core	D	35	1					

Insert Calculated Field

Name:

Formula:

Fields:

# Analysing Data with Pivot Tables

## Calculated Field and Calculated Item

Once we have created a PivotTable, we can add calculated fields and calculated items in it

- Calculated fields help us enhance the results by allowing us to write our own formulas. This functionality helps to create a new field in the table that performs the calculations based on other pivot fields. Let us understand how to use these fields with the help of an example..
- We can also add one or more calculated items in a PivotTable field apart from the existing items. Calculated items are used to perform calculations between items within the fields

# Analysing Data with Pivot Tables

## Calculated Field and Calculated Item

Row Labels	Sum of Overall Sales Amount	Sum of NPD Sales Amount	Sum of % of NPD
Anil	120000	70000	58%
Deepak	45000	20000	44%
Mahesh	90000	45000	50%
Narender	400000	200000	50%
Rajender	209000	124000	59%
Rajesh	80000	35000	44%
Sunil	100000	60000	60%
Suresh	50000	30000	60%
Vikas	75000	45000	60%
Yash	49000	19000	39%
Grand Total	1218000	648000	53%

**PIVOTTABLE TOOLS**

**ANALYZE** **DESIGN**

Fields, Items, & Sets +  
OLAP Tools +  
Relationships

Calculations

**Insert Calculated Field**

Name: % of NPD

Formula: = 'NPD Sales Amount' / 'Overall Sales Amount'

Fields:  
Emp\_Code  
Employee Name  
Designation  
Overall Sales Amount  
NPD Sales Amount  
Eligible for Incentive  
Net Figure

Insert Field

OK Close

# Dashboarding

- ❑ Create and format different types of charts such as Thermometer and Pareto Charts
- ❑ Importance of interactive charts
- ❑ Form Controls such as Combo box, Check box, and Radio buttons

An appropriately designed dashboard can:

- ❑ Quicken decision-making processes
- ❑ Provide better coordination for your organization's efforts
- ❑ Record the performance outcome

Let's say a large automobile component manufacturer is looking for a detailed analysis of Profit/Sales across various regions in a product-wise manner.



# Dashboarding

- ❑ Using dashboards, the data visualization tool of Excel, it is easy to create the detailed analysis reports.
- ❑ These dashboard reports will provide insights and alert us in case of negative trends or projections for Profit/Sales in specific regions which can then be used to develop future strategy.
- ❑ Dashboards are highly effective in validating the effectiveness of the matrices captured over time and bringing out the leading trends.
- ❑ Dashboards help consolidate and organize these metrics through a summary.

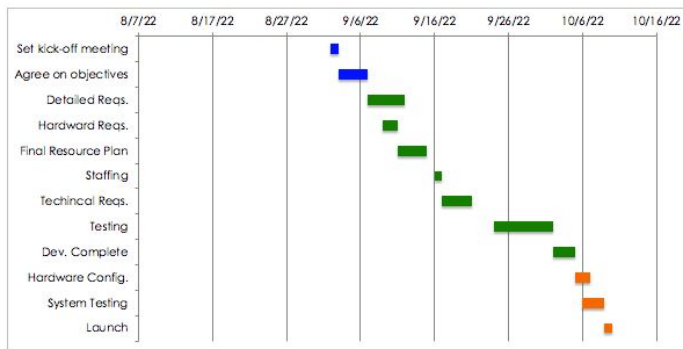


# Dashboarding

## PROJECT MANAGEMENT DASHBOARD

PROJECT NAME	[Name]
REPORT DATE	[Date]
PROJECT STATUS	On track
COMPLETED	27%

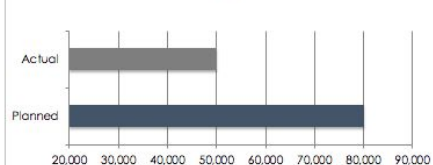
TASKS	ASSIGNED TO	PRIORITY	STATUS
Set kick-off meeting	Alex B.		COMPLETE
Agree on objectives	Frank C.	★	COMPLETE
Detailed Requests	Jacob S.		COMPLETE
Hardware Requests	Jacob S.	★	OVERDUE
Final Resource Plan	Jacob S.		INPROGRESS
Staffing	Alex B.	★	INPROGRESS
Technical Requests	Frank C.		NOT STARTED
Testing	Kennedy K.	★	NOT STARTED
Dev. Complete	Jacob S.	★	NOT STARTED
Hardware Configuration	Alex B.		NOT STARTED
System Testing	Kennedy K.	★	NOT STARTED
Launch			



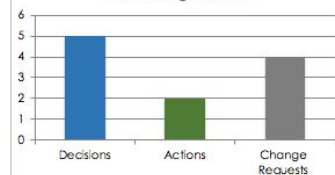
### Overall Task Status



### Budget

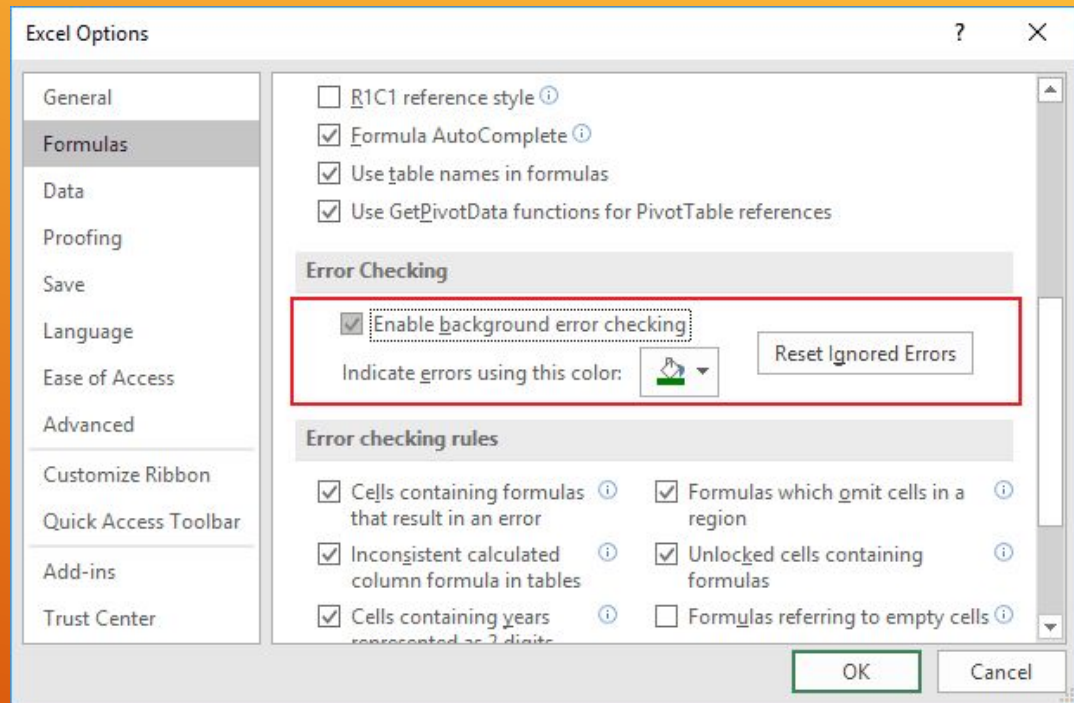


### Pending Items





# Error Checking



# Show Formulas

## Show Formula in Excel

The screenshot displays the Microsoft Excel interface with the **Formulas** ribbon selected. The **Advanced** options in the **Formulas** task pane are expanded, and the checkbox for **Show formulas in cells instead of their calculated results** is checked. A tooltip for the **Show Formulas** button on the ribbon is also visible.

**Formulas Ribbon:**

- Function Library: AutoSum, Logical, Text, Date & Time, Financial, Lookup & Reference, Math & Trig, More Functions
- Defined Names: Name Manager, Use in Formula, Create from Selection
- Formula Auditing: Trace Precedents, Trace Dependents, Remove Arrows, Evaluate Formula, **Show Formulas**, Error Checking

**Formulas Task Pane (Advanced):**

Display options for this worksheet: Sheet3

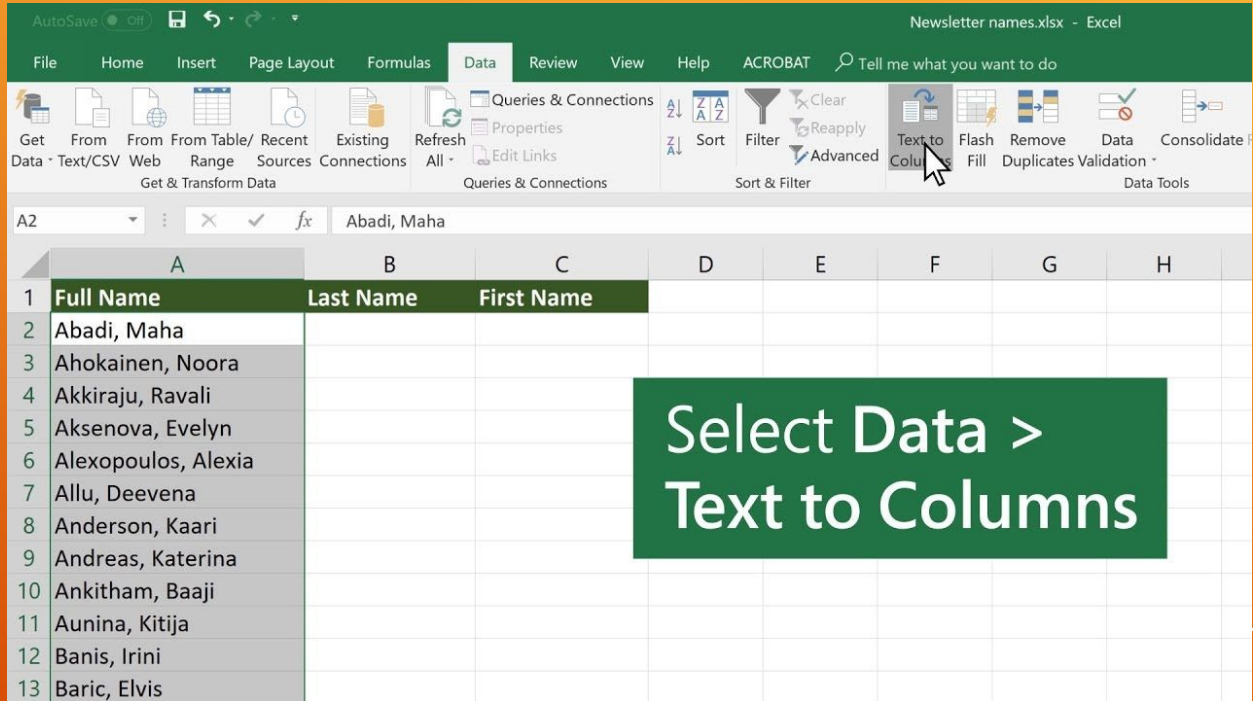
- ☒ Show row and column headers
- ☒ **Show formulas in cells instead of their calculated results**
- ☐ Show sheet right-to-left
- ☐ Show page breaks
- ☒ Show a zero in cells that have zero value
- ☒ Show outline symbols if an outline is applied
- ☐ Show gridlines

**Show Formulas (Ctrl+`)**  
Display the formula in each cell instead of the resulting value.  
Press F1 for more help.

**Worksheet Data:**

A	B	C	D	E	F
					<b>Total</b>
				=D5+E5	=D5+E5
					=D6+E6
					=D7+E7
					=SUM(F5:F7)

# Text to Column



AutoSave: Off

Newsletters names.xlsx - Excel

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

Get From From From From Recent Existing Refresh Properties Queries & Connections Sort Filter Clear Reapply Advanced Text to Columns Flash Fill Remove Duplicates Data Validation Consolidate

Data Text/CSV Web Range Sources Connections All Edit Links Queries & Connections Sort & Filter Data Tools

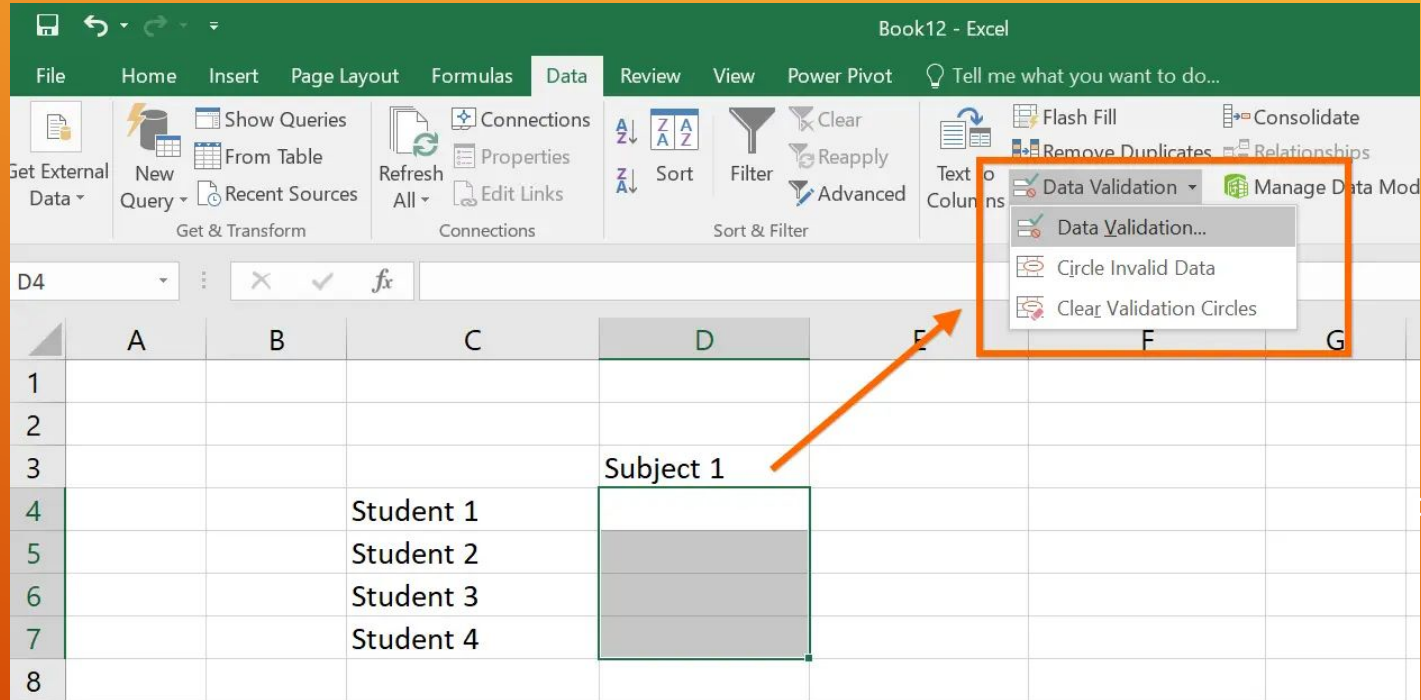
A2

Abadi, Maha

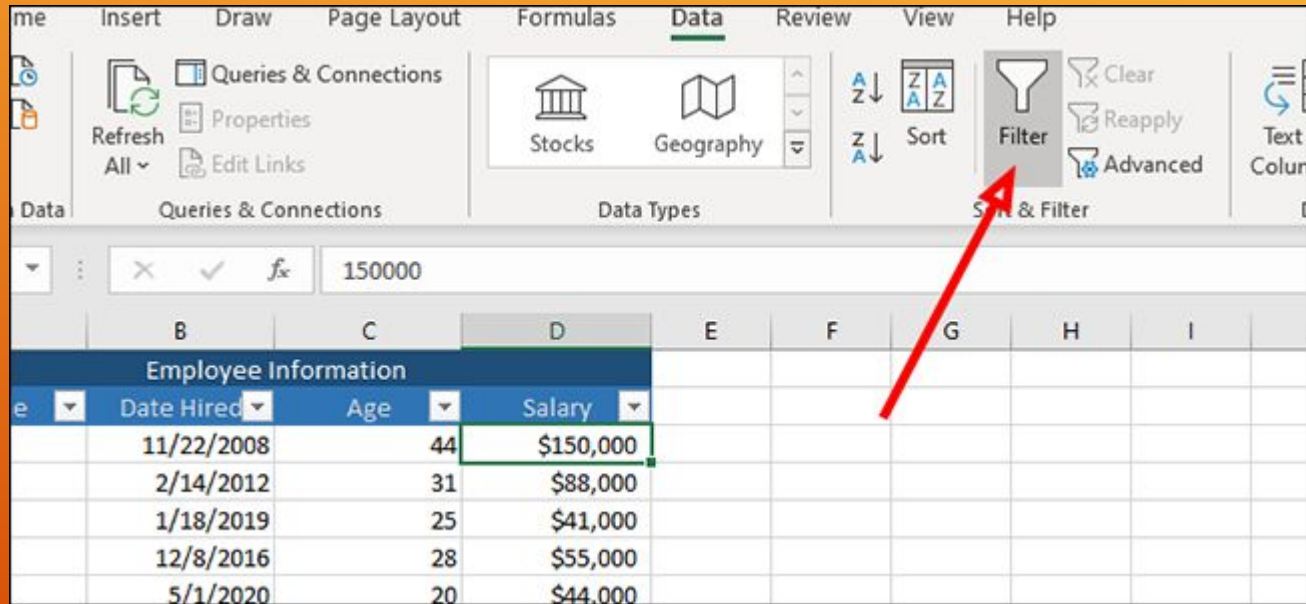
	A	B	C	D	E	F	G	H
1	Full Name	Last Name	First Name					
2	Abadi, Maha							
3	Ahokainen, Noora							
4	Akkiraju, Ravali							
5	Aksenova, Evelyn							
6	Alexopoulos, Alexia							
7	Allu, Deevena							
8	Anderson, Kaari							
9	Andreas, Katerina							
10	Ankitham, Baaji							
11	Aunina, Kitija							
12	Banis, Irini							
13	Baric, Elvis							

Select Data > Text to Columns

# Data Validation



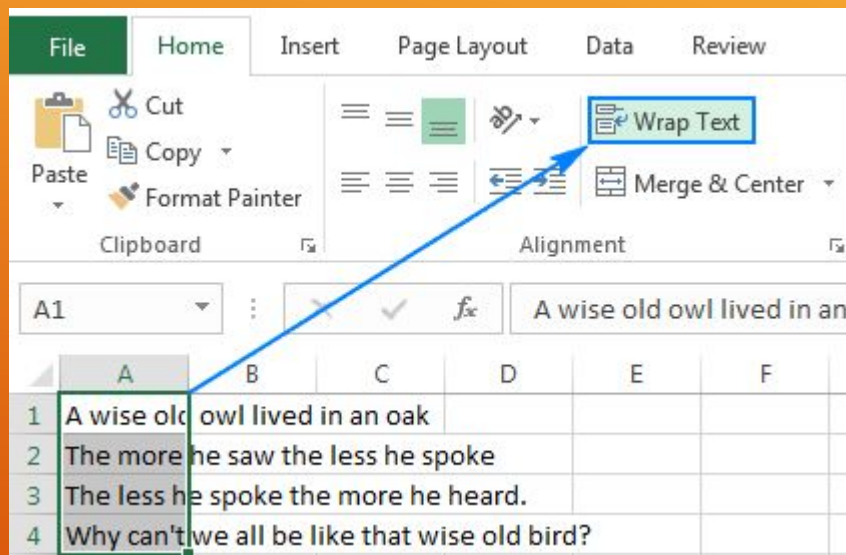
# Sort And Filter



The screenshot displays the Microsoft Access interface. The ribbon is set to the 'Data' tab, which includes sections for 'Queries & Connections', 'Data Types', and 'Sort & Filter'. The 'Filter' button, represented by a funnel icon, is highlighted with a red arrow. Below the ribbon, the 'Employee Information' table is visible, with columns for Date Hired, Age, and Salary. The first row of data shows an employee hired on 11/22/2008, aged 44, with a salary of \$150,000.

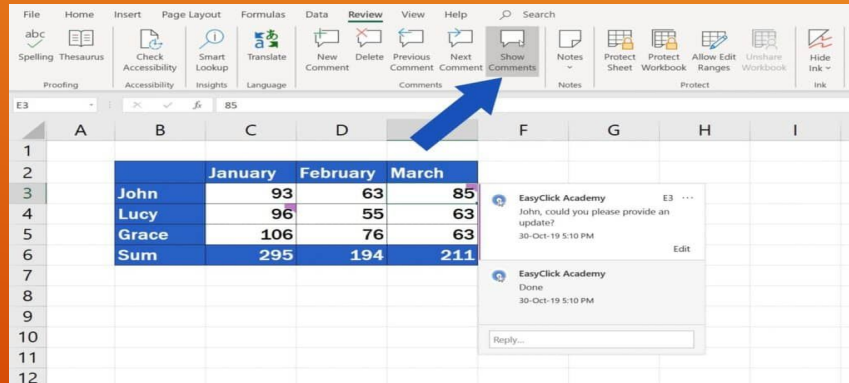
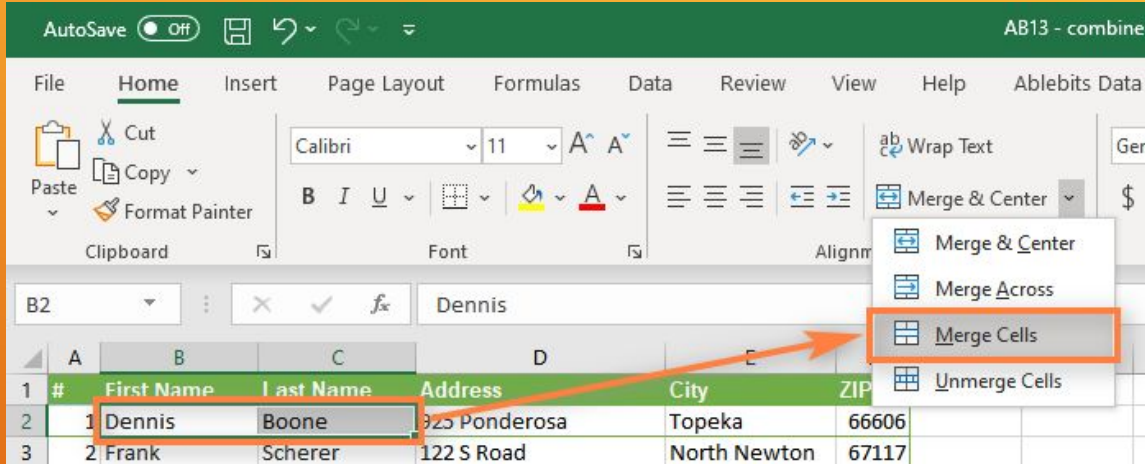
Date Hired	Age	Salary
11/22/2008	44	\$150,000
2/14/2012	31	\$88,000
1/18/2019	25	\$41,000
12/8/2016	28	\$55,000
5/1/2020	20	\$44,000

# Wrap Text



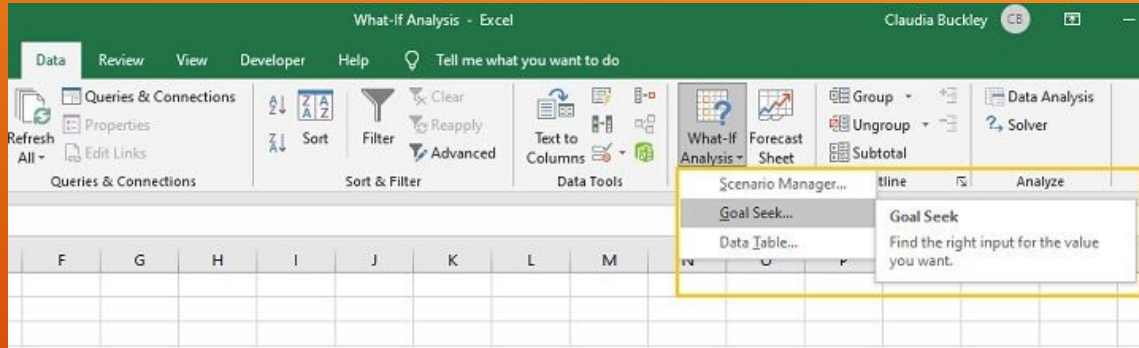


# Merge Cell & Insert Comments



# What-if Tools

**What-If Analysis** is the process of changing the values in cells to see how those changes will affect the outcome of formulas on the worksheet. Three kinds of What-If Analysis tools come with Excel: Scenarios, Goal Seek, and Data Tables. Scenarios and Data tables take sets of input values and determine possible results.





# Scenario Manager

File Home Insert Page Layout Formulas Data Review View Developer Power Pivot

A B C D E F G H I

1

2 **Event Budget**

3

4

Costs	Amount
Number of Seats	200
Talent	4,000
Rental	500
Lighting	250
Ticketing	200
Insurance	100
<b>Total costs</b>	<b>5,050</b>

12

Revenues	Amount
Price/ticket	35
Ticket sales	7,000
Food & beverage	3,000
<b>Total revenue</b>	<b>10,000</b>

18

<b>Profit or loss</b>	<b>4,950</b>
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19

20

**Scenario Manager** ? X

Scenarios:

- Small Venue
- Medium Venue

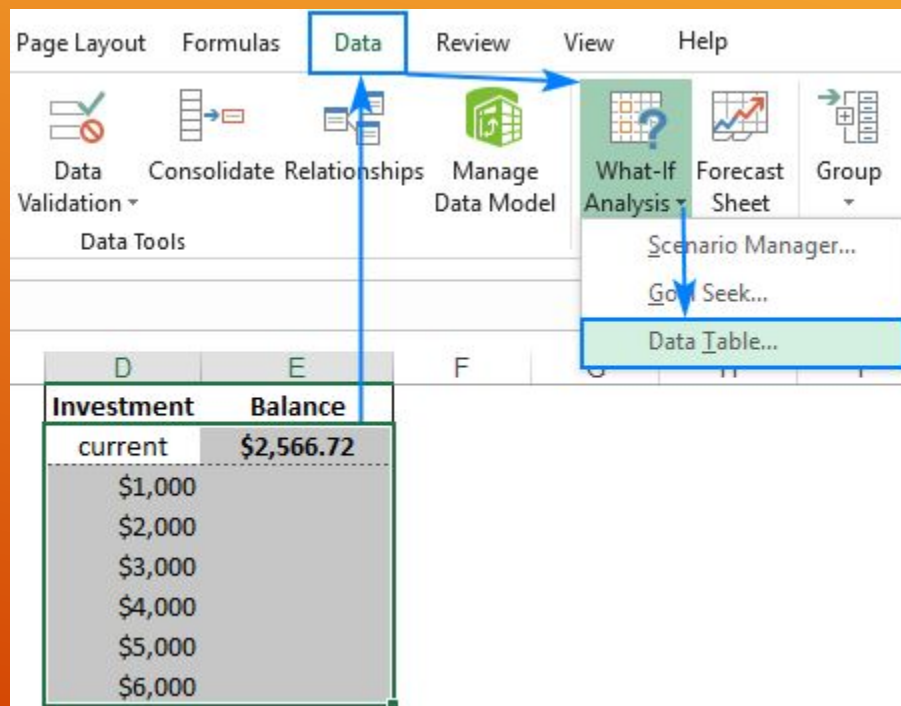
Add...  
Delete  
Edit...  
Merge...  
Summary...

Changing cells: \$C\$5:\$C\$10,\$C\$14

Comment: Values in Small Venue

Show Close

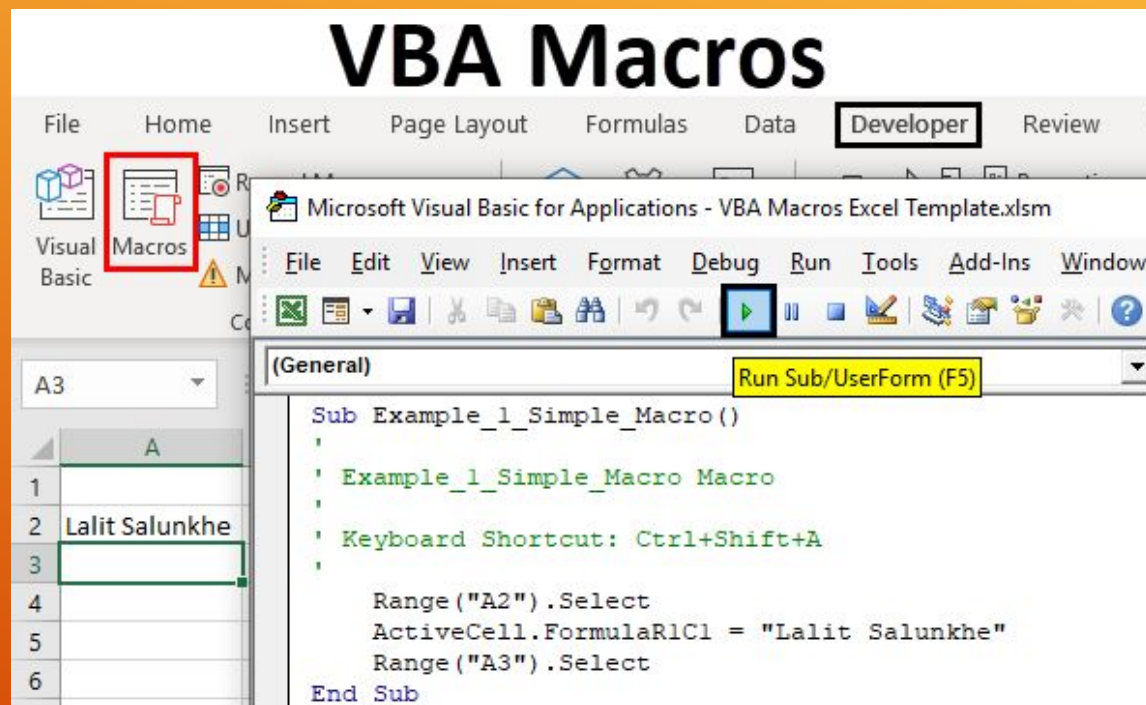
# Data Table



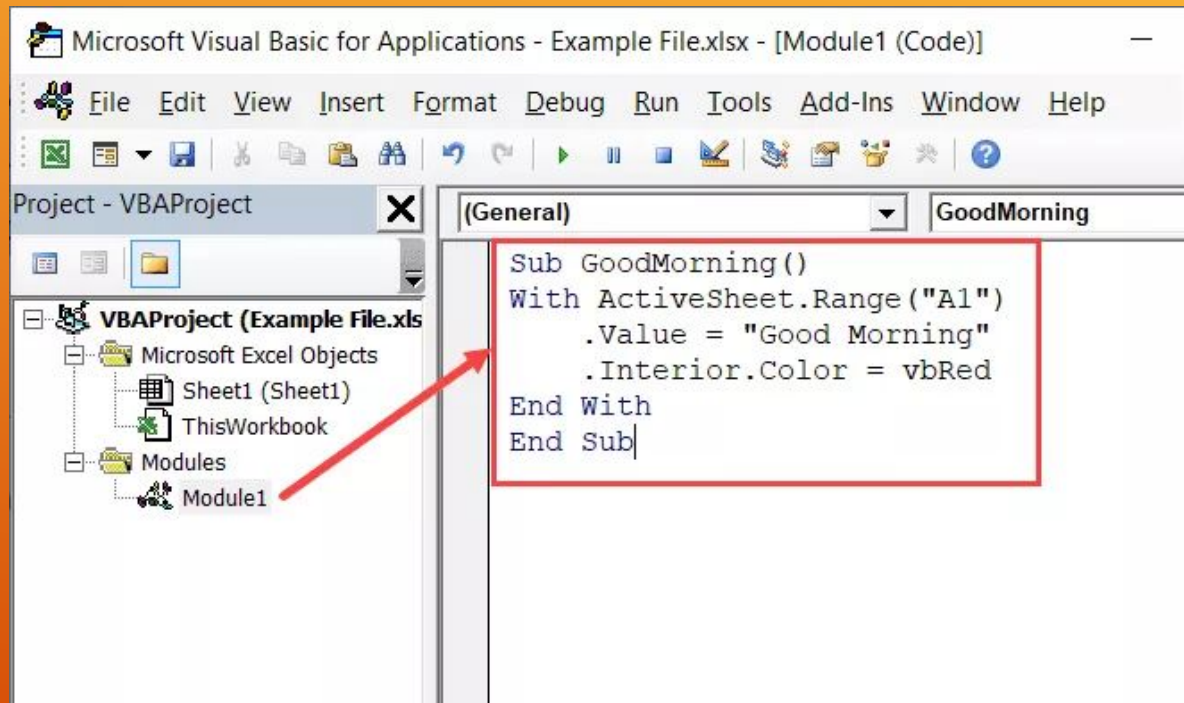
The screenshot shows the Microsoft Excel interface with the 'Data' tab selected on the ribbon. The 'What-If Analysis' dropdown menu is open, and the 'Data Table...' option is highlighted. A blue arrow points from the 'Data' tab to the 'What-If Analysis' dropdown, and another blue arrow points from the dropdown to the 'Data Table...' option.

Investment	Balance
current	\$2,566.72
\$1,000	
\$2,000	
\$3,000	
\$4,000	
\$5,000	
\$6,000	

# VBA & Macros



# Assign A Macros



# Record A Macros

