

# LAB PROGRAMS



## Part- A: Spreadsheet (Excel)

1. CONDITIONAL FORMATTING, IF, COUNTIF, SUMIF, AVERAGE, CONCAT
2. INDEX, MATCH, UNIQUE, IFS, COUNTIFS, SUMIFS, AVERAGEIFS
3. VLOOKUP, HLOOKUP, XLOOKUP, COUNT, COUNTA
4. LEFT, MID, RIGHT, LEN, SUBSTITUTE, SEARCH, ISNUMBER
5. TODAY, NOW, YEAR, MONTH, NETWORKDAYS, EOMONTH
5. OFFSET, CHOOSE, LET, MAX, SORT, SORTBY, RANK
6. FILTER, FREQUENCY, SEQUENCE, RANDARRAY, IFERROR
7. PIVOT TABLES, WHAT-IF ANALYSIS, DATA VALIDATION, SUBTOTALS WITH RANGES
8. Develop an interactive dashboard for the Financial Sample Excel workbook

## Part- B: Data Analysis using Python

1. **Probability**
  - a. Calculating the simple probabilities
  - b. Applications of Probability distributions to real life problems
2. **Test of significance**
  - a. T-Test: one sample, two independent samples and paired
  - b. ANOVA & Chi-Square Test
3. **Correlation and Regression analysis**
  - a. Scattered diagram, calculating of correlation coefficient
  - b. Linear regression: fitting, testing model adequacy and prediction (simple and multiple)
  - c. Fitting of logistic regression

## Part- C: Power BI

1. Introduction to Power BI- Get Started with Power BI - Sign up for Power BI - Overview: Power BI data sources - Connect to a SaaS solution - Upload a local CSV file - Connect to Excel data that can be refreshed - Create a Report with Visualizations
2. Using visualizations - Create a new report - Create and arrange visualizations - Format a visualization - Use text, map, and gauge visualizations and save a report - Use a slicer to filter visualizations - Sort, copy, and paste visualizations
3. Modify and Print a Report - Rename and delete report pages - Add a filter to a page or report Set visualization interactions - Send a report to PowerPoint
4. Create a Dashboard - Create and manage dashboards - Pin a report tile to a dashboard - Pin a live report page to a dashboard - Pin a tile from another dashboard - Pin an Excel element to a dashboard - Add a tile to a dashboard

## Part A : Spreadsheet (Excel)

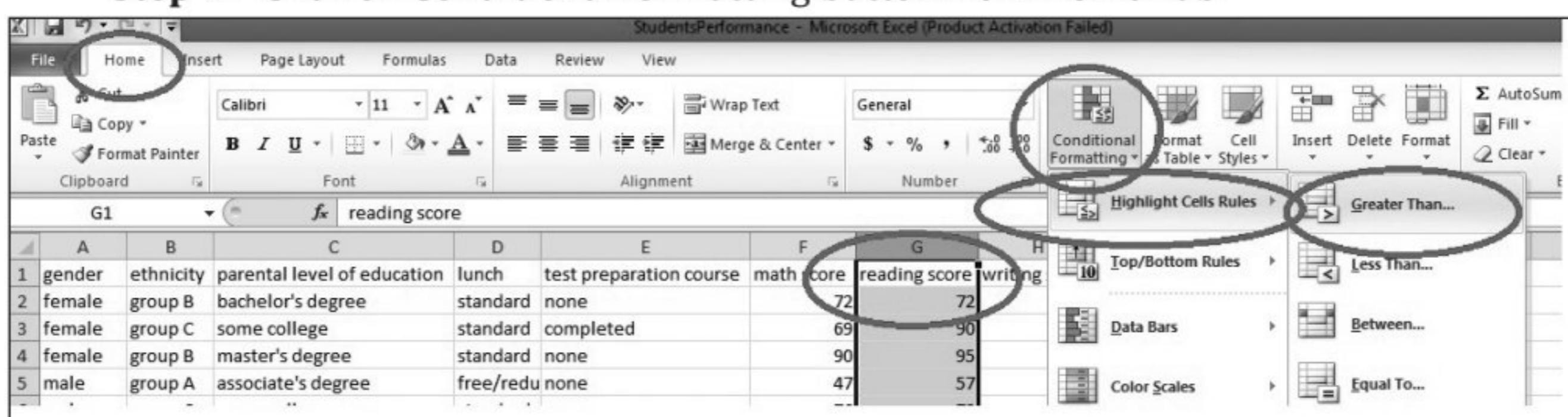
### Program 1 : Conditional Formatting, IF, COUNTIF, SUMIF, AVERAGE, CONCAT

#### (a) Conditional formatting on Sample Store Data Set

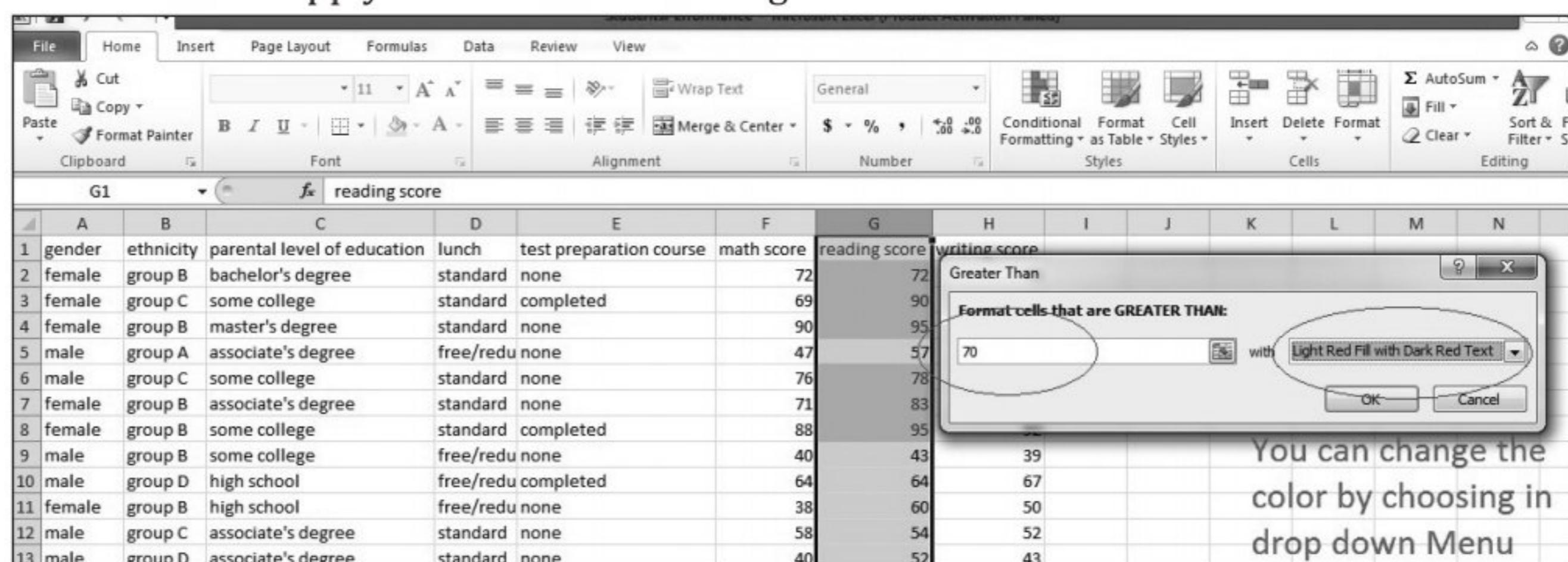
##### (i) Apply Conditional formatting on "Reading Score" as follows

**Step 1:** Select the entire column to which we want apply conditional formatting ( In this example we are applying on "Reading Score")

**Step 2:** Click on Conditional formatting button from Home Tab



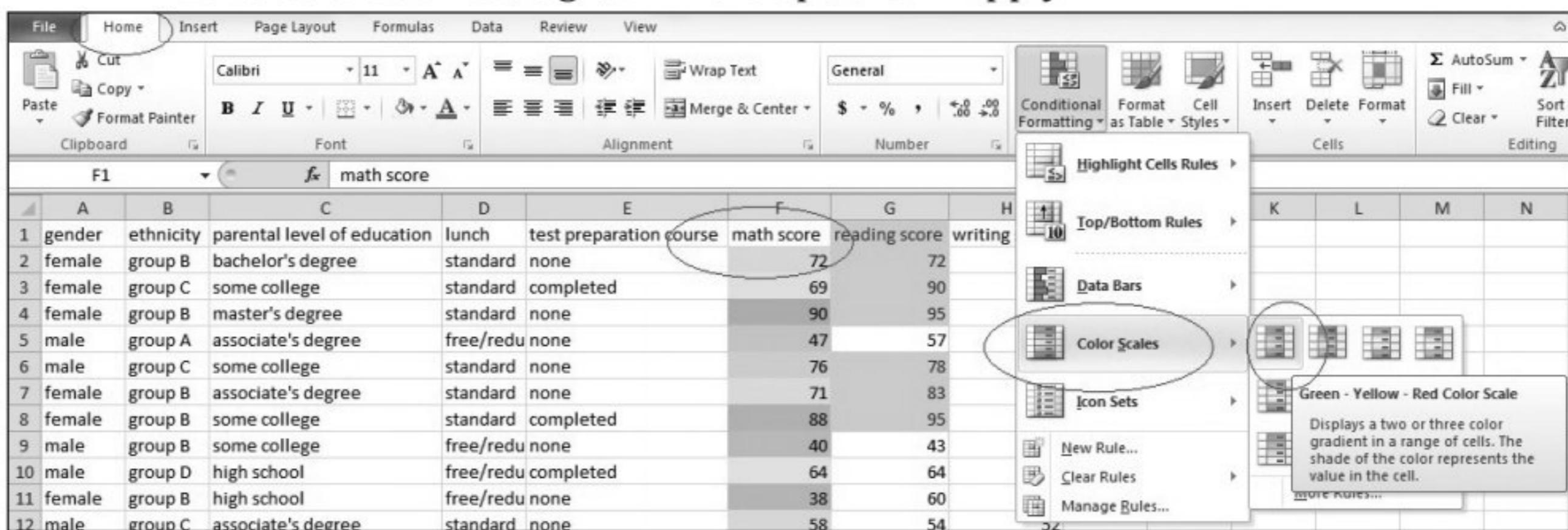
**Step 3:** Select Highlight Cell rule Option → Select Greater Than option → Enter the Value we want to apply conditional formatting



Similarly, we can apply the conditional formatting for Less than, Equal to and Between Options also.

##### (ii) Color Scale Formatting:

Select Conditional Formatting from Home Tab → select color scale from Dropdown List  
→ Select the color code given in the options → Apply



Highest Value will be highlighted by Pink and Lowest Value is highlighted by Green Color.  
The range of Values will highlighted by lightening the pink color

### (b) If Condition:

If Function is predefined function in Excel, which results in either **true** or **False** based on condition

**General Syntax:** =IF(logical\_test, [value\_if\_true], [value\_if\_false])

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score						
2	female	group B	bachelor's degree	standard	none	72	72	74	=IF(H2>40,"Pass","Fail")					
3	female	group C	some college	standard	completed	69	90	88	IF(logical_test, [value_if_true], [value_if_false])					
4	female	group B	master's degree	standard	none	90	95	93						
5	male	group A	associate's degree	free/redu	none	47	57	44						
6	male	group C	some college	standard	none	76	78	75						
7	female	group B	associate's degree	standard	none	71	83	78						
8	female	group B	some college	standard	completed	88	95	92						
9	male	group B	some college	free/redu	none	40	43	39						
10	male	group D	high school	free/redu	completed	64	64	67						
11	female	group B	high school	free/redu	none	38	60	50						
12	male	group C	associate's degree	standard	none	58	54	52						
13	male	group D	associate's degree	standard	none	40	52	43						

=if (H9>40,"Pass","Fail")

**(Applied on Writing score Filed values)**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score						
2	female	group B	bachelor's degree	standard	none	72	72	74	Pass					
3	female	group C	some college	standard	completed	69	90	88	Pass					
4	female	group B	master's degree	standard	none	90	95	93	Pass					
5	male	group A	associate's degree	free/redu	none	47	57	44	Pass					
6	male	group C	some college	standard	none	76	78	75	Pass					
7	female	group B	associate's degree	standard	none	71	83	78	Pass					
8	female	group B	some college	standard	completed	88	95	92	Pass					
9	male	group B	some college	free/redu	none	40	43	39	Fail					
10	male	group D	high school	free/redu	completed	64	64	67	Pass					
11	female	group B	high school	free/redu	none	38	60	50	Pass					
12	male	group C	associate's degree	standard	none	58	54	52	Pass					
13	male	group D	associate's degree	standard	none	40	52	43						

### (c) Countif Function:

Which counts number elements present in the range selected based on condition specified.

**Syntax:**

=COUNTIF(Range, criteria)

Range Specifies the range of cells selected.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score						
2	female	group B	bachelor's degree	standard	none	72	72	74	=COUNTIF(H:H,>50)					
3	female	group C	some college	standard	completed	69	90	88	COUNTIF(range, criteria)					
4	female	group B	master's degree	standard	none	90	95	93						
5	male	group A	associate's degree	free/redu	none	47	57	44						
6	male	group C	some college	standard	none	76	78	75						
7	female	group B	associate's degree	standard	none	71	83	78						

**StudentsPerformance - Microsoft Excel (Product Activation Failed)**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876						
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93							
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75							
7	female	group B	associate's degree	standard	none	71	83	78							
8	female	group B	some college	standard	completed	88	95	92							
9	male	group B	some college	free/redu	none	40	43	39							
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							

Output: Total 876

#### (d) Sumif Function:

This calculates the sum of values in a range based on criteria specified.

**Syntax :** =SUMIF(range, criteria, [sum\_range])

=SumIF(H:H,>60")

Applied on Writing Score field values

**StudentsPerformance - Microsoft Excel (Product Activation Failed)**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876 CountIF						
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93							
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75							
7	female	group B	associate's degree	standard	none	71	83	78							
8	female	group B	some college	standard	completed	88	95	92							
9	male	group B	some college	free/redu	none	40	43	39							
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							

SumIF Function

**StudentsPerformance - Microsoft Excel (Product Activation Failed)**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876 CountIF						
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93							
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75							
7	female	group B	associate's degree	standard	none	71	83	78							
8	female	group B	some college	standard	completed	88	95	92							
9	male	group B	some college	free/redu	none	40	43	39							
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							
12	male	group C	associate's degree	standard	none	58	54	52							

SumIF

Output

#### (e) Average Function:

Statistical Function to find the average of given range of cells.

**Syntax:** =AVERAGE (number1, [number2], ...)

=Average(H:H)

(Applied on Writing Score Field Values)

**StudentsPerformance - Microsoft Excel (Product Activation Failed)**

**Formula Bar:** =AVERAGE(H:H)

**Table Data:**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876	CountIF					
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93	53049	SumIF					
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75	=AVERAGE(H:H)						
7	female	group B	associate's degree	standard	none	71	83	78	AVERAGE(number1, [number2], ...)						
8	female	group B	some college	standard	completed	88	95	92							
9	male	group B	some college	free/redu	none	40	43	39							
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							
12	male	group C	associate's degree	standard	none	58	54	52							

**Output:** 68.054

### (f) Concatenate Function:

Used to combine two or more values into single value

**Syntax:** =CONCATENATE(text1, [text2], ...)

= Concatenate (C8, D8)

Applied on C8 and D8 Cell Address

**StudentsPerformance - Microsoft Excel (Product Activation Failed)**

**Formula Bar:** =CONCATENATE(C8,D8)

**Table Data:**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876	CountIF					
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93	53049	SumIF					
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75	68.054	Average					
7	female	group B	associate's degree	standard	none	71	83	78							
8	female	group B	some college	standard	completed	88	95	92	=CONCATENATE(C8,D8)						
9	male	group B	some college	free/redu	none	40	43	39	CONCATENATE(text1, [text2], [text3], ...)						
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							
12	male	group C	associate's degree	standard	none	58	54	52							
13	male	group D	associate's degree	standard	none	40	52	43							
14	female	group B	high school	standard	none	65	81	73							
15	male	group A	some college	standard	completed	78	72	70							

**Applied Cell:** Selected Cell Address

The screenshot shows a Microsoft Excel spreadsheet titled "StudentsPerformance - Microsoft Excel (Product Activation Failed)". The formula bar at the top displays the formula =CONCATENATE(C8,D8). The spreadsheet contains 15 rows of data with columns labeled A through O. Column A has gender values (female, female, female, female, male, male, female, female, male, male, female, male). Column B has ethnicity values (group B, group C, group C, group B, group A, group C, group B, group B, some college, group D, group B, group B, group C, group D, group B, male). Column C has parental level of education values (bachelor's degree, some college, some college, master's degree, associate's degree, some college, associate's degree, some college, free/reduced, high school, high school, high school, associate's degree, associate's degree, high school, group A). Column D has lunch values (standard, standard, completed, standard, none, standard, none, standard, free/reduced, free/reduced, free/reduced, free/reduced, standard, standard, standard, standard). Column E has test preparation course values (none, completed, none, none, none, none, none, completed, none, completed, none, none, none, none, none). Columns F, G, H, I, J, K, L, M, N, O contain various scores and counts. A callout box labeled "Output" points to cell I8, which contains the result of the CONCATENATE function: "some collegestandard".

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score							
2	female	group B	bachelor's degree	standard	none	72	72	74	876	CountIF					
3	female	group C	some college	standard	completed	69	90	88							
4	female	group B	master's degree	standard	none	90	95	93	53049	SumIF					
5	male	group A	associate's degree	free/redu	none	47	57	44							
6	male	group C	some college	standard	none	76	78	75	68.054	Average					
7	female	group B	associate's degree	standard	none	71	83	78							
8	female	group B	some college	standard	completed	88	95	92	some college	standard	Concatenate				
9	male	group B	some college	free/redu	none	40	43	39							
10	male	group D	high school	free/redu	completed	64	64	67							
11	female	group B	high school	free/redu	none	38	60	50							
12	male	group C	associate's degree	standard	none	58	54	52							
13	male	group D	associate's degree	standard	none	40	52	43							
14	female	group B	high school	standard	none	65	81	73							
15	male	group A	some college	standard	completed	78	72	70							

## Program 2 : INDEX, MATCH, UNIQUE , IFS, COUNTIFS, SUMIFS, AVERAGEIFS

### (a) Index:

It fetches the values present in the specified index.

**Syntax:** =INDEX( table, row\_number, column\_number )

Where Table Specifies the range of selected text or M X N Values, Row Specifies the row number and Column specifies the Column Number.

**Example:** =INDEX(A1:G8,3,4)

The screenshot shows two instances of Microsoft Excel. The top instance shows a formula bar with =INDEX(A1:G8,3,4) and a table below with 15 rows and 11 columns. The bottom instance shows a formula bar with =INDEX(A1:G8,3,4) and a table below with 4 rows and 9 columns. In both cases, the formula is applied to cell I3, which contains the value "standard". A callout box labeled "Applied Cell" points to cell I3. Another callout box labeled "Output" points to cell I3 in the bottom instance.

	A	B	C	D	E	F	G	H	I	J	K	L
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score				
2	female	group B	bachelor's degree	standard	none	72	72	74	88	=INDEX(A1:G8,3,4)		
3	female	group C	some college	standard	completed	69	90	93	92	INDEX(array, row_num, [column_num])		
4	female	group B	master's degree	standard	none	90	95	93	92	INDEX(reference, row_num, [column_num], [ar		
5	male	group A	associate's degree	free/reduced	none	47	57	44	44	Applied Cell		
6	male	group C	some college	standard	none	76	78	75	75			
7	female	group B	associate's degree	standard	none	71	83	78	78			
8	female	group B	some college	standard	completed	88	95	92	92			
9	male	group B	some college	free/reduced	none	40	43	39	39			

	A	B	C	D	E	F	G	H	I	J
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score		
2	female	group B	bachelor's degree	standard	none	72	72	74	88	standard
3	female	group C	some college	standard	completed	69	90	93	92	Index
4	female	group B	master's degree	standard	none	90	95	93	92	Output

### (b) Match:

The MATCH function searches for a specified item in a range of cells, and then returns the relative position of that item in the range.

**Syntax:** =MATCH(lookup\_value, lookup\_list, [match\_type]) Where, Lookup Values specifies what we want to search and Lookup list specifies the source data set range.

**Example:** = MATCH("associates's degree",C:C,1)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score						
2	female	group B	bachelor's degree	standard	none	72	72	74						
3	female	group C	some college	standard	completed	69	90	88	standard	Index				
4	female	group B	master's degree	standard	none	90	95	93						
5	male	group A	associate's degree	free/reduced	none	47	57	44	=MATCH("associates's degree",C:C,1)					
6	male	group C	some college	standard	none	76	78	75	MATCH(lookup_value, lookup_array, [match_type])					
7	female	group B	associate's degree	standard	n	Finds the largest value that is less than or equal to lookup_value. Lookup_array must be placed in ascending order			1 - Less than					
8	female	group B	some college	standard	completed	88	95	92	0 - Exact match					
9	male	group B	some college	free/reduced	none	40	43	39	Applied Cell					
10	male	group D	high school	free/reduced	completed	64	64	67						

	A	B	C	D	E	F	G	H	I	J
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score		
2	female	group B	bachelor's degree	standard	none	72	72	74		
3	female	group C	some college	standard	completed	69	90	88	standard	Index
4	female	group B	master's degree	standard	none	90	95	93		
5	male	group A	associate's degree	free/reduced	none	47	57	44	65	Match
6	male	group C	some college	standard	none	76	78	75	Output	
7	female	group B	associate's degree	standard	none	71	92	70		

### (c) Unique:

Returns a unique values from a range of array.

**Syntax:** =Unique(Array,[by Column],[exactly once])

**Example:** =Unique(B3:B10)

	B	C	D	E
	Given Array	Output		
	Srikanth	=UNIQUE(B3:B10)		
	Rathan J	Applied Cell		
	Arun			
	Mahesh			
	Varun			
	Srikanth			
	Vasantha			
	Srikanth			

B	C	D	E	F
Given Array	Output			
Srikanth	Srikanth			
Rathan J	Rathan J			
Arun	Arun			
Mahesh	Mahesh			
Varun	Varun			
Srikanth	Vasantha			
Vasantha	Output			
Srikanth				

### (d) IFS:

Checks whether multiple conditions are met and returns TRUE or FALSE depends on satisfied condition.

**Syntax :** =IFS(Logical Value1,"Value",[Logical Value2],...)

**Example :** =IFS(D3>80,"A",D3>60,"B",TRUE,"F")

A	B	C	D	E	F	G	H	I	J
Given Array	Unique		Marks	Grade					
Srikanth	Srikanth		85	=IFS(D3>80,"A",D3>60,"B",TRUE,"F")	Applied Cell				
Rathan J	Rathan J		65						
Arun	Arun		50						
Mahesh	Mahesh		70						
Varun	Varun		80						
Srikanth	Vasanth		90						
Vasanth									
Srikanth									

Calibri (Body)	11	B	Formula	F
B	C	D	E	F
Given Array	Unique	Marks	Grade	
Srikanth	Srikanth	85	A	
Rathan J	Rathan J	65	B	
Arun	Arun	50	F	
Mahesh	Mahesh	70	B	
Varun	Varun	80	B	
Srikanth	Vasanth	90	A	
Vasanth			Output	
Srikanth				

### (e) CountIFS:

It Applies criteria to cells across the specified range and count the number of times the criteria met.

**Syntax:** =COUNTIFS(criteria\_range1, criteria1, [criteria\_range2, criteria2]...)

**Example:** =COUNTIFS(F:F,>60")

	A	B	C	D	E	F	G	H	I	J	K
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score			
2	female	group B	bachelor's degree	standard	none	72	72	74			
3	female	group C	some college	standard	completed	69	90	88	standard	Index	
4	female	group B	master's degree	standard	none	90	95	93			
5	male	group A	associate's degree	free/reduced	none	47	57	44	65	Match	
6	male	group C	some college	standard	none	76	78	75			
7	female	group B	associate's degree	standard	none	71	83	78	661	CountIFS	
8	female	group B	some college	standard	completed	88	95	92			

	A	B	C	D	E	F	G	H	I	J	K
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score			
2	female	group B	bachelor's degree	standard	none	72	72	74			
3	female	group C	some college	standard	completed	69	90	88	standard	Index	
4	female	group B	master's degree	standard	none	90	95	93			
5	male	group A	associate's degree	free/reduced	none	47	57	44	65	Match	
6	male	group C	some college	standard	none	76	78	75			
7	female	group B	associate's degree	standard	none	71	83	78	661	CountIFS	
8	female	group B	some college	standard	completed	88	95	92		Output	

### (f) SumIFS:

It calculates the Sum of Specified data set values based on conditions.

**Syntax:** =SUMIFS(sum\_range, criteria\_range1, criteria1, [criteria\_range2, criteria2], ...)

**Example:** = SUMIFS(F:F,D:D,"=s\*",G:G,>50")

	A	B	C	D	E	F	G	H	I	J	K	L
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score				
2	female	group B	bachelor's degree	standard	none	72	72	74				
3	female	group C	some college	standard	completed	69	90	88	standard	Index		
4	female	group B	master's degree	standard	none	90	95	93				
5	male	group A	associate's degree	free/reduced	none	47	57	44	65	Match		
5	male	group C	some college	standard	none	76	78	75				
7	female	group B	associate's degree	standard	none	71	83	78	661	CountIFS		
8	female	group B	some college	standard	completed	88	95	92				
9	male	group B	some college	free/reduced	none	40	43	39	=SUMIFS(F:F,D:D,"=s*",G:G,>50")			
0	male	group D	high school	free/reduced	completed	64	64	67	Applied Cell			

	A	B	C	D	E	F	G	H	I	J	K
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score			
2	female	group B	bachelor's degree	standard	none	72	72	74			
3	female	group C	some college	standard	completed	69	90	88	standard	Index	
4	female	group B	master's degree	standard	none	90	95	93			
5	male	group A	associate's degree	free/reduced	none	47	57	44	65	Match	
6	male	group C	some college	standard	none	76	78	75			
7	female	group B	associate's degree	standard	none	71	83	78	661	CountIFS	
8	female	group B	some college	standard	completed	88	95	92			
9	male	group B	some college	free/reduced	none	40	43	39	43026	SumIFS	
										Output	

(g) Average IFS:

Returns the average (arithmetic mean) of all cells that meet multiple criteria.

**Syntax:**

= AVERAGEIFS(average\_range, criteria\_range1, criteria1, [criteria\_range2, criteria2],...)

**Example:**

= AVERAGEIFS(F:F,G:G,>60")

=AVERAGEIFS(F:F,G:G,>60") Formula							
C	D	E	F	G	H	I	J
I of education	lunch	test preparation course	math score	reading score	writing score		
ree	standard	none	72	72	74		
ee	standard	completed	69	90	88	standard	Index
e	standard	none	90	95	93		
egree	free/reduced	none	47	57	44	65	Match
egree	standard	none	76	78	75		
egree	standard	none	71	83	78	661	CountIFS
egree	standard	completed	88	95	92		
egree	free/reduced	none	40	43	39	43026	SumIFS
egree	free/reduced	completed	64	64	67		
egree	free/reduced	none	38	60	50	=AVERAGEIFS(F:F,G:G,>60")	
egree	standard	none	58	54	52	Applied Cell	
egree	standard	none	40	52	43		

=AVERAGEIFS(F:F,G:G,>60") Formula							
C	D	E	F	G	H	I	J
I of education	lunch	test preparation course	math score	reading score	writing score		
ree	standard	none	72	72	74		
ee	standard	completed	69	90	88	standard	Index
e	standard	none	90	95	93		
egree	free/reduced	none	47	57	44	65	Match
egree	standard	none	76	78	75		
egree	standard	none	71	83	78	661	CountIFS
egree	standard	completed	88	95	92		
egree	free/reduced	none	40	43	39	43026	SumIFS
egree	free/reduced	completed	64	64	67		
egree	free/reduced	none	38	60	50	71.83586	AverageIFS
egree	standard	none	58	54	52		

**Program 3 : VLOOKUP, HLOOKUP, XLOOKUP, COUNT, COUNTA**(a) Vlookup**Example:**

= VLOOKUP(D3,B2:C8,2, FALSE)

The screenshot shows a Microsoft Excel interface with the following details:

- Formula Bar:** Displays the formula `=VLOOKUP(D3,B2:C8,2,FALSE)`.
- Ribbon:** The "General" tab is selected in the ribbon.
- Table:** A data table is displayed in columns A through M. Column A is labeled "Given Array". Column B is labeled "Marks". Column C is labeled "Unique". Column D is labeled "Grade".
- Data:** The table contains the following data:

Given Array	Marks	Unique	Grade
Srikanth	85	Srikanth	A
Rathan J	65	Rathan J	B
Arun	50	Arun	F
Mahesh	70	Mahesh	B
Varun	80	Varun	B
Vasanth		Vasanth	
- Applied Cell:** The formula `=VLOOKUP(D3,B2:C8,2,FALSE)` is highlighted as the "Applied Cell".
- Description:** A tooltip provides the description of the VLOOKUP function: "VLOOKUP(lookup\_value, table\_array, col\_index\_num, [range\_lookup])".
- Example:** An example of the function usage is shown: `=VLOOKUP(103, A2:B26, 2, FALSE)`.
- Parameters:** The tooltip also defines the parameters:
  - lookup\_value:** is the value to be found in the first column of the table, and can be a value, a reference, or a text string.
  - table\_array:** is a table of text, numbers, or logical values, in which data is retrieved. Table\_array can be a reference to a range or a range name.
  - col\_index\_num:** is the column number in table\_array from which the matching value should be returned. The first column of values in the table is column 1.

Calibri (Body) 11 B A

X ✓ fx =VLOOKUP(D3,B2:C8,2, FALSE) Formula

B	C	D	E	F	G
Given Array	Marks	Unique	Grade	VlookUp	
Srikanth	85	Srikanth	A	85	
Rathan J	65	Rathan J	B	65	
Arun	50	Arun	F	50	
Mahesh	70	Mahesh	B	70	
Varun	80	Varun	B	80	
Vasanth		Vasanth		Output	

(b) Hlookup:

### **Example:**

= HLOOKUP(B12,A12:G13,2,FALSE)

Calibri (Body) 11 B A ... E F G H

316 X ✓ f<sub>x</sub> =HLOOKUP(B12,A12:G13,2, FALSE) Formula

	A	B	C	D	E	F	G	H
12	Given Array	Srikanth	Rathan J	Arun	Mahesh	Varun	Vasanth	
13	Marks	85	65	50	70	80	75	
14								
15		Applied Cell						
16	Hlookup	=HLOOKUP(B12,A12:G13,2, FALSE)						
17		HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup]) ^						
18								
19		<b>Description</b>						
20		Looks for a value in the top row of a table or array of values and returns the value in the same column from a row you specify						
21								
22		<b>Example</b>						
23		=HLOOKUP("Axles", A1:C4, 2, TRUE)						
24								
25	lookup_value	is the value to be found in the first row of the table and can be a value, a reference, or a text string						
26	table_array	is a table of text, numbers, or logical values in which data is looked up. Table_array can be a reference to a range or a range name						
27	row_index_num	is the row number in table_array from which the matching value should be returned. The first row of						
28								
29								

X ✓ f<sub>x</sub> =HLOOKUP(B12,A12:G13,2, FALSE) Formula

	A	B	C	D	E	F	G	H
2		Given Array	Marks	Unique	VlookUp			
3		Srikanth		85 Srikanth		85		
4		Rathan J		65 Rathan J		65		
5		Arun		50 Arun		50		
6		Mahesh		70 Mahesh		70		
7		Varun		80 Varun		80		
8		Vasanth		75 Vasanth				
9								
10								
11								
12	Given Array	Srikanth	Rathan J	Arun	Mahesh	Varun	Vasanth	
13	Marks	85	65	50	70	80	75	
14								
15		Srikanth						
16	Hlookup	85						
17		Ouput						
18								
19								
20	row_index_num	is the row number in table_array from which the matching value should be returned. The first row of						
21								
22								
23								
24								
25								
26								
27								
28								
29								

### (c) Xlookup:

The XLOOKUP function searches a range or an array, and then returns the item corresponding to the first match it finds.

**Syntax:** =xlookup(Lookup\_value, Lookup\_array, Return\_Array, [if\_not\_found], [match\_found])

**Example:** =XLOOKUP(Table1[@Column1],B:B,C:C)

The screenshot shows a Microsoft Excel spreadsheet with a table of names and designations. In cell E1, the formula `=XLOOKUP(Table1[@Column1],B:B,C:C)` is entered. A tooltip is displayed over the formula, providing detailed information about the XLOOKUP function. The tooltip includes the function signature `XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])`, a description stating it searches a range or array for a match and returns the corresponding item from a second range or array, and examples. It also defines the parameters: `lookup_value` is the value to search for, `lookup_array` is the array or range to search, `return_array` is the array or range to return, `[if_not_found]` is returned if no match is found, `[match_mode]` specifies how to match `lookup_value` against the values in `lookup_array`, and `[search_mode]` specifies the search mode to use. By default, a first to last search will be used.

The screenshot shows the same Excel spreadsheet after the XLOOKUP formula has been applied. The formula `=XLOOKUP(Table1[@Column1],B:B,C:C)` is still in the formula bar. The output of the formula, "Tech Lead", is now displayed in cell E1, with the word "Output" written below it. The rest of the table remains unchanged.

**(d) Count:**

Counts the numbers that are appeared in the given range of Values

**Syntax:** = Count(Value1, Value2,...,Valuen)

**Example:** =COUNT(D8:D17)

=COUNT(D8:D17) Formula

C	D	E	F	G	H	I
Designation	Column1					
Tech Lead		What is the Desgnation of				
Lecturer	Srikanth	Tech Lead				
Manager		Applied Cell				
Software Engineer	12	=COUNT(D8:D17)				
Lecturer	10	COUNT(value1, [value2], ...)				
Lecturer	14					
Developer	16	Description				
Coder	18	Counts the number of cells in a range that contain				
Smasher	20	numbers				
Lecturer	25	Example				
Lecturer	12	=COUNT(A2:A7)				
Care Taker	10					
Lecturer	18	value1 value1,value2,... are 1 to 255 arguments that				
		can contain or refer to a variety of different				
		types of data, but only numbers are counted				
		[value2] value1,value2,... are 1 to 255 arguments that				
		can contain or refer to a variety of different				
		types of data, but only numbers are counted				

f<sub>x</sub> =COUNT(D8:D17) Formula

C	D	E	F
Designation	Column1		
Tech Lead		What is the Desgnation of	
Lecturer	Srikanth	Tech Lead	
Manager			
Software Engineer	12	10	Count
Lecturer	10	Output	
Lecturer	14		
Developer	16		
Coder	18		
Smasher	20		
Lecturer	25		
Lecturer	12		
Care Taker	10		
Lecturer	18		

**(e) CountA:**

Count the number of cells that are not empty

**Syntax:** =CountA(Value1, Value2..., Valuen)

**Example:** =COUNTA(D8:D17)

C	D	E	F	G	H
Designation	Column1				
Tech Lead		What is the Desgnation of			
Lecturer	Srikanth	Tech Lead			
Manager					
Software Engineer	12		7	Count	
Lecturer	10				
Lecturer		Applied Cell			
Developer	16	=COUNTA(D8:D17)	CountA		
Coder	18				
Smasher	20				
Lecturer					
Lecturer	12				
Care Taker	10				
Lecturer					

C	D	E	F	G
Designation	Column1			
Tech Lead		What is the Desgnation of		
Lecturer	Srikanth	Tech Lead		
Manager				
Software Engineer	12		7	Count
Lecturer	10			
Lecturer		Output		
Developer	16		7	CountA
Coder	18			
Smasher	20			
Lecturer				
Lecturer	12			
Care Taker	10			
Lecturer				

**Program 4 : LEFT, MID, RIGHT, LEN, SUBSTITUTE, SEARCH, ISNUMBER**

A	B	C	D	E
Text	Formula	Example	Output	
Sitadevi Ratanchand Nahar Adarsh College	=left(text,num_Char)	=left(A2,8)	Sitadevi	
Skyward Publications	=mid(text, start_Pos, Num_char)	=mid(A3,4,4)	ward	
Sreekanth	=right(text,num_char)	=right(A4,5)	kanth	
Rathan	=len(text)	=len(A5)	6	
Data Analytics	=substitute(text,old_text,new_text,[Instances])	=substitute(A6,"Analytics","Mining")	Data Mining	
Python Programming	=search(find_text,within_text,[start_num])	=search("Program",A7)	8	
Computer Networks	=isnumber(value) returns true or false	=isnumber(a) False	FALSE	
545		=isnumber(89) TRUE	TRUE	
Web	=Conatenate(text1,text2)	=concatenate(A10,A11)	WebProgramming	
Programming				

**Program 5 : TODAY, NOW, YEAR, MONTH, NETWORKDAYS, EOMONTH**

A	B	C	D	E	F	G
SI.NO	Date Functions	Formula	Example	Output		
1	Today	=today()	=today()	23-01-2024		
2	Now	=now()	=Now()	23-01-2024 15:16		
3	Year	=year(Serial_num)	=Year(Today())	2024		
4	Month	=Month(Serial_Num)	=Month(1)	1	Start Date	End Date
5	NetworkDays	=Netwrokdays(start_date,End_date,[Holidays])	=Networkdays(F5,G5)	262	01-01-2024	31-12-2024
6	EOMonth	=EOMonth(start_date,Months)	=EOMonth(F6,4)	30-04-2024	23-01-2024	

**Program 6 : OFFSET, CHOOSE, LET, MAX, SORT, SORTBY, RANK****(a) Offset :**

OFFSET can be used with any function expecting a reference argument.

**Syntax:** =OFFSET(Reference, rows,col,[Height],[[width]])

**Example :** =OFFSET(B6,3,2,2,2)

The screenshot shows a Microsoft Excel spreadsheet with a table of monthly data. The table has columns for Month, East, and West. The formula `=OFFSET(B6,3,2,2,2)` is entered in the formula bar, and its result is shown in the applied cell as `OFFSET(B6,3,2,2,2)`. A tooltip for the formula is displayed, explaining its parameters: `reference` is the reference from which you want to base the offset, a reference to a cell or range of adjacent cells; `rows` is the number of rows, up or down, that you want the upper-left cell of the result to refer to; and `cols` is the number of columns, to the left or right, that you want the upper-left cell of the result to refer to.

A	B	C	D	E	F	G
Month	East	West				
Jan		15	45	Offsets Output		
Feb		50	28	49	0	
Mar		52	46	15	0	
Apr		24	50			
May		28	52			
Jun		30	49			
Jul		45	15			
Aug		28	50			
Sep		46	52			
Oct		50	24			
Nov		52	28			
Dec		49	30			

### (b) Choose:

Select the cell where you want the returned value to appear ..

**Syntax:** =Choose(Appear Value, Value1,Value 2,...)

**Example:**

=CHOOSE(4,D5,D6,D7,D8,D9,D10,D11) Formula

C	D	E	F	G	H
ast	West				
15	45				
50	28				
52	46				
24	50	Choose Applied Cell			
28	52	=CHOOSE(4,D5,D6,D7,D8,D9,D10,D11)			
30	49	CHOOSE(index_num, value1, [value2], ...)			
45	15	Description			
28	50	Chooses a value or action to perform from a list of values, based on an index number			
46	52	Example			
50	24	=CHOOSE(3, "Wide", 115, "world", 8)			
52	28	index_num specifies which value argument is selected. Index_num must be between 1 and 254, or a formula or a reference to a number between 1 and 254			
49	30				

=CHOOSE(4,D5,D6,D7,D8,D9,D10,D11) Formula

C	D	E	F
st	West		
15	45		
50	28		
52	46		
24	50	Choose	
28	52	52	Output
30	49		
45	15		
28	50		
46	52		
50	24		
52	28		
49	30		

### (c) Let:

The LET function assigns names to calculation results.

**Syntax:** =Let(name1, value1, name2, value2, Calculation expression)

**Example:** =LET(x,3,y,4,x\*y+x-y)

**Applied Cell**

```
=LET(x,3,y,4,x*y+x-y)
```

---

**Description**

Assigns calculation results to names. Useful for storing intermediate calculations and values by defining names inside a formula. These names only apply within the scope of the LET function.

**Example**

```
=LET(total, SUM(A1:A10), count, COUNT(A1:A10), total / count)
```

Calibri (Body) 11 B

```
=LET(x,3,y,4,x*y+x-y)
```

**Formula**

A	B	C	D
Let Output			
	11	Output	

#### (d) Sort,Sortby, Rank:

Rank= The number whose rank you want to find											
A	B	C	D	E	F	G	H	I	J	K	L
15	Values	Formula	Example	Output							
10		=Max(Value1, Value2,..)	=Max(B2:B9)	35							
20		Sort=Sort(array, [SortBy])	=sort(B2:B9)	-15	10	10	15	25	25	30	35
25		sortby=sortby(array, 2ndarray, sortby)	=sortby(b2:b9,A2:A9,1)	-15	10	25	30	10	35	15	25
10		Rank= The number whose rank you want to find	=RANK(30,\$B\$2:\$B\$9)	2							
12											
15											
6											
4											

### Program 7 : FILTER, FREQUENCY, SEQUENCE, RANDARRAY, IFERROR

#### (a) FILTER:

The FILTER function allows you to filter a range of data based on criteria you define.

**Syntax:** =Filter(Array, include, [If Empty])

=FILTER(A5:D16,C5:C16=G4,"")

The screenshot shows a Microsoft Excel spreadsheet with a data table in columns A-D and a filter applied in column F. The formula bar displays the formula =FILTER(A5:D16,C5:C16=G4,""). A tooltip window is open over the formula, providing detailed information about the FILTER function. The tooltip includes the syntax =FILTER(array, include, [if\_empty]), a description of filtering a range or array, an example =FILTER(A5:D20, (C5:C20="Apple")\*(A5:A20="East"), ""), and definitions for array (the range or array to filter), include (an array of booleans where TRUE represents a row or column to retain), and [if\_empty] (returned if no items are retained). There are also links to learn more about FILTER and give feedback.

The screenshot shows a Microsoft Excel spreadsheet with a data table in columns A-D. The formula bar displays the formula =FILTER(A5:D16,C5:C16=G4,""). The output of the filter is shown in columns F-I, specifically filtering rows where the Product is Apple. The resulting output shows four rows: East, Rama, Apple, 20; South, Soma, Apple, 24; South, Thomos, Apple, 35; and North, Geetha, Orange, 40.

#### (b) Frequency:

The FREQUENCY function calculates how often values occur within a range of values, and then returns a vertical array of numbers.

**Syntax:** =FREQUENCY(data\_array, bins\_array)

**Example:** = FREQUENCY(H:H,G:G)

=FREQUENCY(H:H,G:G) Formula

	D	E	F	G	H	I	J	K
f education	lunch	test preparation course	math score	reading score	writing score			
ee	standard	none	72	72	74			
ee	standard	completed	69	90	88	standard	Index	
ee	standard	none	90	95	93			
ee	free/reduced	none	47	57	44	65	Match	
ee	standard	none	76	78	75			
ee	standard	none	71	83	78	661	CountIFS	
ee	standard	completed	88	95	92			
ee	free/reduced	none	40	43	39	43026	SumIFS	
ee	free/reduced	completed	64	64	67			
ee	free/reduced	none	38	60	50	71.83586	AverageIFS	
ee	standard	none	58	54	52			
ee	standard	none	40	52	43			
ee	standard	none	65	81	73			
ee	standard	completed	78	72	70			
ol	standard	none	50	53	58	=FREQUENCY(H:H,G:G)		
ol	standard	none	69	75	78			
ol	standard	none	88	89	86	Applied Cell		
ol	free/reduced	none	18	32	28			
ol	free/reduced	completed	46	42	46			

B	C	D	E	F	G	H	I	J	K
ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score			
group B	bachelor's degree	standard	none	72	72	74			
group C	some college	standard	completed	69	90	88	standard	Index	
group B	master's degree	standard	none	90	95	93			
group A	associate's degree	free/reduced	none	47	57	44	65	Match	
group C	some college	standard	none	76	78	75			
group B	associate's degree	standard	none	71	83	78	661	CountIFS	
group B	some college	standard	completed	88	95	92			
group B	some college	free/reduced	none	40	43	39	43026	SumIFS	
group D	high school	free/reduced	completed	64	64	67			
group B	high school	free/reduced	none	38	60	50	71.83586	AverageIFS	
group C	associate's degree	standard	none	58	54	52			
group D	associate's degree	standard	none	40	52	43			
group B	high school	standard	none	65	81	73			
group A	some college	standard	completed	78	72	70			
group A	master's degree	standard	none	50	53	58	25	Frequency	
group C	some high school	standard	none	69	75	78	Output		
group C	high school	standard	none	88	89	86			
group B	some high school	free/reduced	none	18	32	28			
group C	master's degree	free/reduced	completed	46	42	46			

### (c) IFERROR :

Specifies the error caption what we have given in the syntax.

**Syntax:** =IFERROR(Value, Value\_if\_Error)

**Example:** =IFERROR(10/0,"Divide By Zero Error")

Output

Divide By Zero Error

**Program 8 :****PIVOT TABLES, WHAT IF ANALYSIS, DATA VALIDATION, SUBTOTALS WITH RANGES****(a) Pivot Table:**

A PivotTable is a powerful tool to calculate, summarize, and analyze data that lets you see comparisons, patterns, and trends in your data.

**Step1.** Select the range of Cells we Want to create PivotTable.

**Step2.** Select Insert Tab → Select PivotTable

**Step3.** Select New Sheet or Existing Sheet where we want to place the PivotTable.

**Step4.** Select OK.

	A	B	C	D	E	F	G
1	gender	ethnicity	parental level of education	lunch	test preparation course	math score	reading score
2	female	group B	bachelor's degree	standard	none	72	72
3	female	group C	some college	standard	completed	69	90
4	female	group B	master's degree	standard	none	90	95
5	male	group A	associate's degree	free/reduced	none	47	57
6	male	group C	some college	standard	none	76	78
7	female	group B	associate's degree	standard	none	71	83
8	female	group B	some college	standard	completed	88	95
9	male	group B	some college	free/reduced	none	40	43
10	male	group D	high school	free/reduced	completed	64	64
11	female	group B	high school	free/reduced	none	38	60
12	male	group C	associate's degree	standard	none	58	54
13	male	group D	associate's degree	standard	none	40	52
14	female	group B	high school	standard	none	65	81
15	male	group A	some college	standard	completed	78	72
16	female	group A	master's degree	standard	none	50	53
17	female	group C	some high school	standard	none	69	75
18	male	group C	high school	standard	none	88	89
19	female	group B	some high school	free/reduced	none	18	32
20	male	group C	master's degree	free/reduced	completed	46	42
21	female	group C	associate's degree	free/reduced	none	54	58

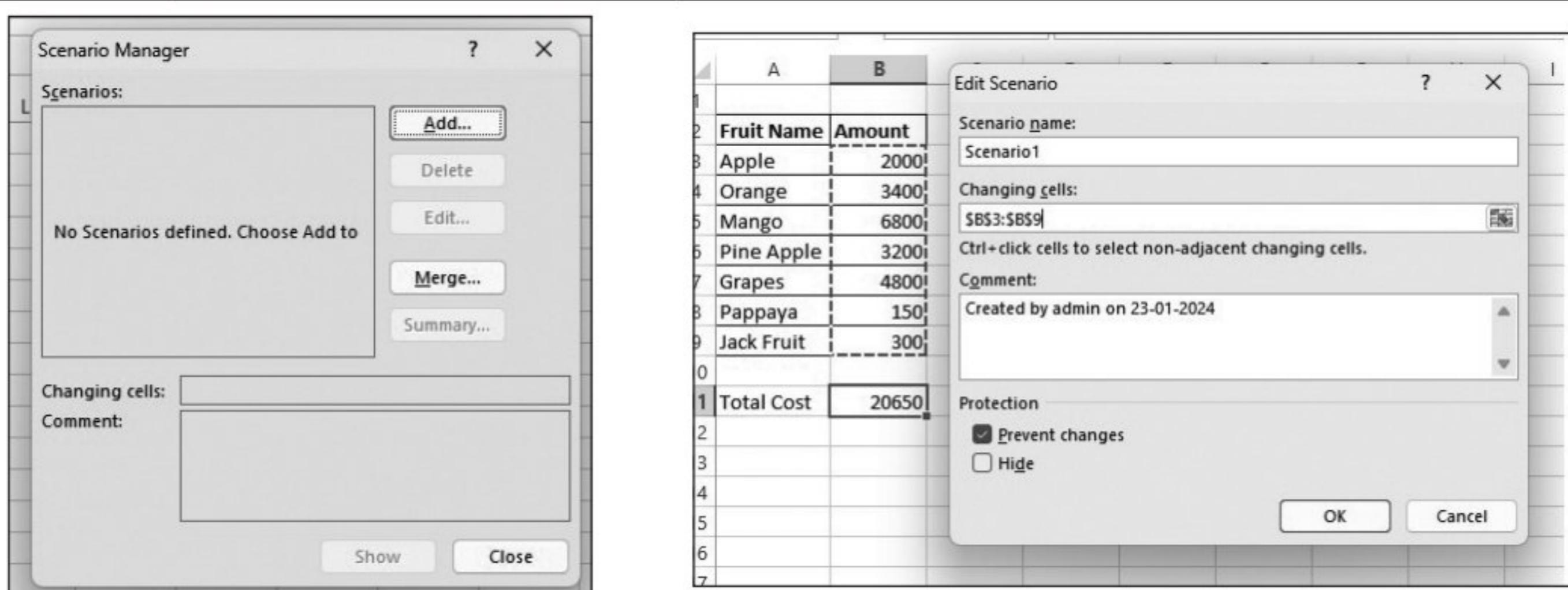
**(b) What if Analysis:**

**Step 1.** Create the data set values (example: Fruit Name and Price)

**Step 2:** Find the Total Cost using Sum().

**Step 3:** Select Data Tab → Select What If Analysis → From the dropdown List, Select Scenario Manager.

**Step 4:** In the scenario Manager Window Click ADD → Enter the Scenario Name, Changing Cells (select the Rate Column) → Click on Ok



Repeat the Step 4 to enter another 2 scenario values.

**Step 5:** Click on Summary to see the report of changes in scenario values.

The left window shows the 'Scenario Manager' dialog with scenarios 'Scenario1' and 'Sc2' listed. The right window shows the 'Scenario Summary' report with columns for 'Current Values', 'Scenario1', 'Scenario2', and '\$3'. It lists changes for cells \$B\$3 through \$B\$9 and the result cell \$B\$11. A note at the bottom explains the current values column represents values at the time the report was created.

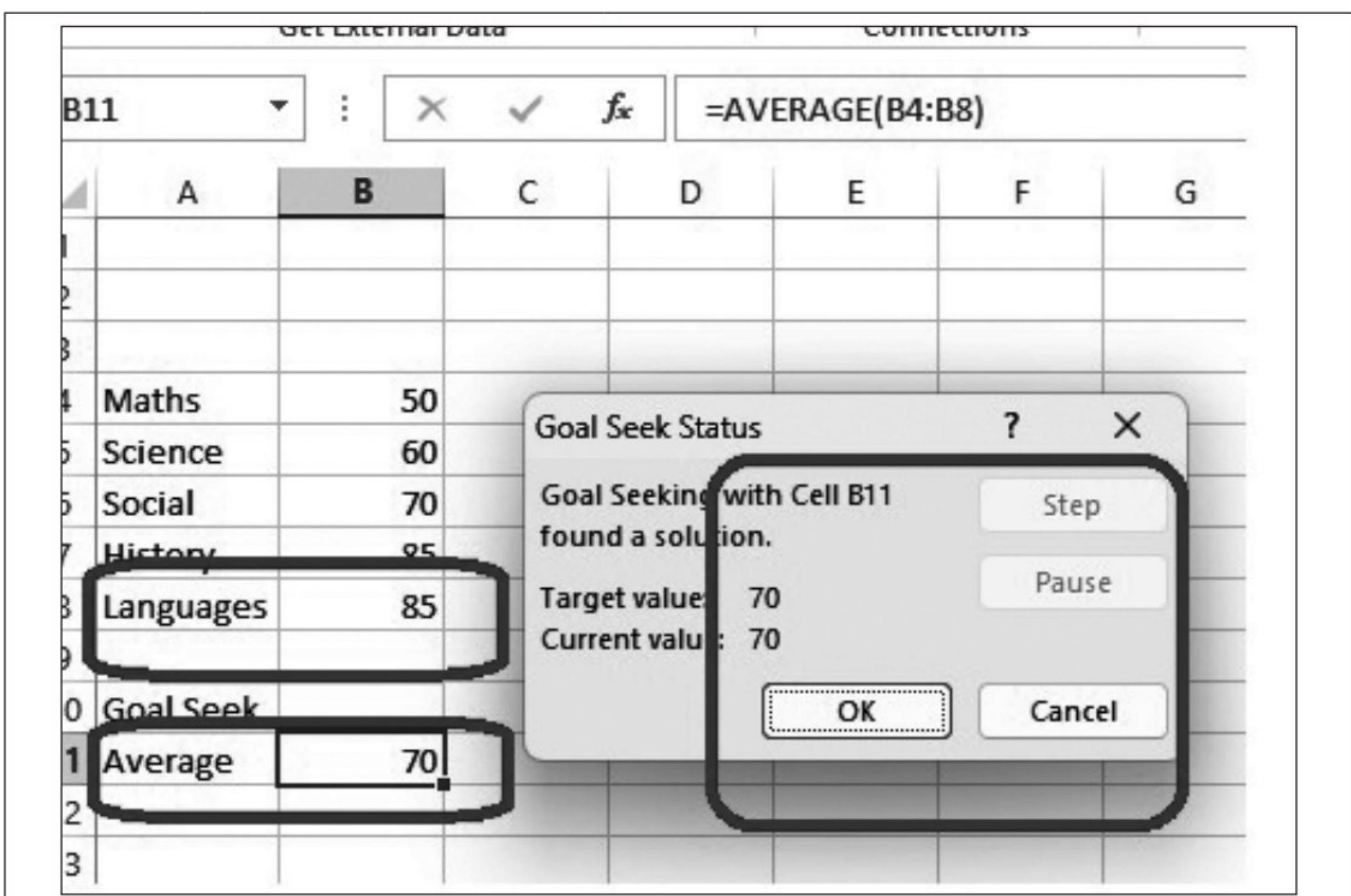
### (c) Goal Seek:

On the Data tab → What-If Analysis → Goal Seek.

In the Set cell box, enter the reference for the cell that contains the formula that you want to resolve.

**Example:**

The left window shows a table with subjects and their marks. The 'Languages' row is highlighted with a red box. The right window shows the 'Goal Seek' dialog with 'Set cell:' set to B11, 'To value:' set to 70, and 'By changing cell:' set to \$B\$8. The background shows the 'Goal Seek Value Setting Table' with the 'Languages' row selected.



**Program 9 :** DEVELOP AN INTERACTIVE DASHBOARD FOR THE FINANCIAL SAMPLE EXCEL WORKBOOK

**Dash Board:**

- Step1:** Create a Pivot Table –Select the complete Sheet → Insert Tab→Pivot Table→ Create new Sheet → select the field with respect to Row and values.
- Step 2:** In the Analyse Tab → Select the Pivot Chart → Select the chart depends on the data field selected (Pie Chart, Bar Char Column chart, etc.) → Ok
- Step 3:** Repeat the Step 1 and step 2 and insert few more charts in different sheets.
- Step4:** Select the charts from different sheets and paste it in new Sheet to create an active dash board.
- Step 5:** Click on Individual Chart → select Analyse Tab →Select Insert Slicer → Select the option depends on Data set and chart fields → ok

Repeat the step 5 for other Pivot charts.

Our Dash Board is ready to use select the options in Slicer automatically the values will change in Pivot chart



## Part B : Data Analysis using Python

### Program 1 : Probability

- (a) Calculating the simple probabilities
- (b) Applications of Probability distributions to real life problems

Output

### Program 2 : Test of Significance

- (a) T-Test: one sample, two independent samples and paired
- (b) ANOVA & Chi-Square Test

Output

### Program 3 : Correlation and Regression analysis

- (a) Scattered Diagram, calculating of correlation coefficient