AICT Lab

WEEK # 7

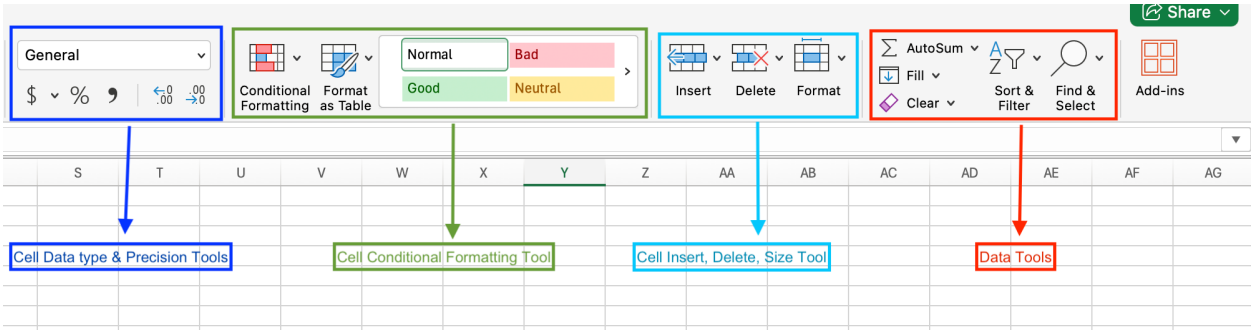
Microsoft Excel

Session 2025

Electrical Engineering Department UET
Lahore

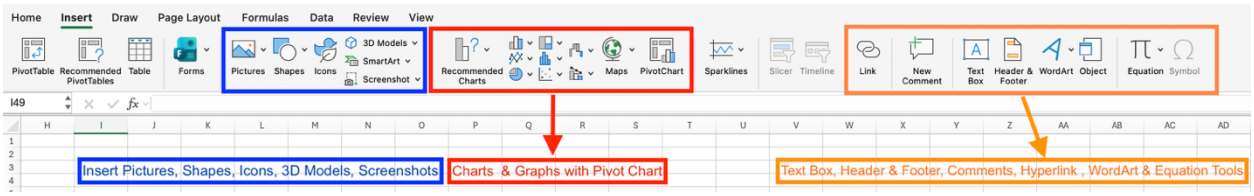
Lab Week # 7 (Microsoft Excel Lab Work)

Main Tools Explained (HOME TAB)



1. **Datatype of Cell**
2. **Conditional Formatting (All types)**
3. **Insert, Delete and Format Cell(s)**
4. **Basic Data Tools**

Main Tools Explained (INSERT TAB)

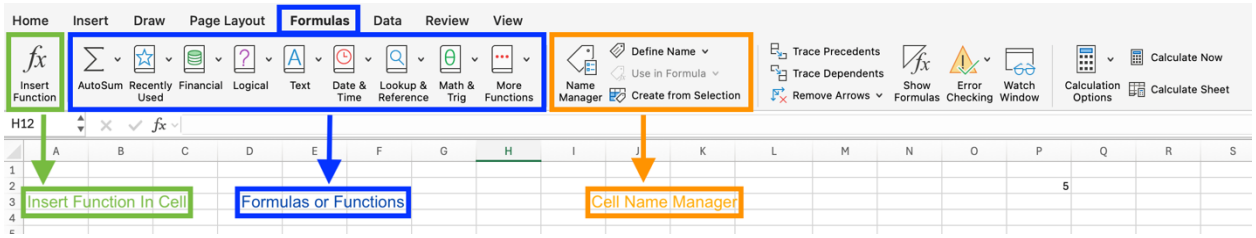


- **Insert Shapes, Pictures, Icons**
- **Insert 3D Models & Emojis**
- **Insert Screenshots**
- **Insert Smart Art (Prebuilt Tables or Hierarchy Tables)**
- **Graphs (Line or Raw Data)**
- **Column & Bar Charts (2D & 3D)**
- **Pie Charts (2D & 3D)**
- **Histograms , Scatter & Bubble Charts**
- **Pivoting of Charts**
- **Inserting Text Boxes**
- **Inserting Headers & Footers**

Lab Week # 7 (Microsoft Excel Lab Work)

- **Inserting WordArt & Objects**
- **Inserting Symbols & Equations**
- **Inserting Comments**

Main Tools Explained (FORMULAS TAB)



- **Insert Formulas & Functions**
- **Cell Name Manager**
- **Insert Function**

Mathematical and Statistical Formulas

1 **SUM**: Adds values in a range.Example: `=SUM(A1:A10)`
2 **AVERAGE**: Calculates the mean of a range.Example: `=AVERAGE(B1:B10)`
3 **MIN**: Finds the smallest value in a range.Example: `=MIN(C1:C10)`
4 **MAX**: Finds the largest value in a range.Example: `=MAX(D1:D10)`
5 **COUNT**: Counts numeric cells in a range.Example: `=COUNT(E1:E10)`
COUNTA: The COUNTA function in Excel or Google Sheets counts the number of non-empty cells in a rangeCounts non-empty cells in a range.Example: `=COUNTA(F1:F10)`
6 **SUMIF**: Adds values meeting a criterion.Example: `=SUMIF(A1:A10, ">100")`
7 **AVERAGEIF**: Averages values meeting a criterion.Example: `=AVERAGEIF(B1:B10, ">50")`
8 **SUMIFS**: Adds values meeting multiple criteria.Example: `=SUMIFS(A1:A10, B1:B10, ">50", C1:C10, "<100")`
`=SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)`

9 **COUNTIFS**: Counts cells meeting multiple criteria.Example: `=COUNTIFS(A1:A10, "Yes", B1:B10, ">10")`
10 **ROUND**: Rounds a number to a specified number of digits.Example: `=ROUND(A1, 2)`
11 **ROUNDDOWN**: Rounds a number down to a specified number of digits.Example: `=ROUNDDOWN(A1, 1)`
12 **ROUNDUP**: Rounds a number up to a specified number of digits.Example: `=ROUNDUP(A1, 1)`
13 **SUBTOTAL**: Performs a specified function (e.g., sum, average) on a filtered range.Example: `=SUBTOTAL(9, A1:A10)`
14 **PRODUCT**: Multiplies values in a range.Example: `=PRODUCT(A1:A5)`

Lab Week # 7 (Microsoft Excel Lab Work)

Logical Formulas

16 **IF**: Returns values based on a logical condition.Example: `=IF(A1>10, "High", "Low")`

17 **IFERROR**: Returns a custom value if a formula results in an error.Example: `=IFERROR(A1/B1, "Error")`

18 **AND**: Checks if all conditions are true.Example: `=AND(A1>10, B1<20)`

19 **OR**: Checks if any condition is true.Example: `=OR(A1>10, B1<20)`

20 **NOT**: Reverses a logical value.Example: `=NOT(A1>10)`

21 **IFS**: Evaluates multiple conditions and returns the first true result.Example: `=IFS(A1>90, "A", A1>80, "B", A1>70, "C")`

Trigonometric Formulas

#	Formula Name	Excel Function	Description	Example Usage
22	Sine	SIN(angle)	Returns the sine of an angle in radians.	=SIN(PI()/6) → 0.5 (sin 30°)
23	Cosine	COS(angle)	Returns the cosine of an angle in radians.	=COS(PI()/3) → 0.5 (cos 60°)
24	Tangent	TAN(angle)	Returns the tangent of an angle in radians.	=TAN(PI()/4) → 1 (tan 45°)
25	Arcsine	ASIN(value)	Returns the arcsine (inverse sine) of a value in radians.	=ASIN(0.5) → 0.5236 radians (30°)
26	Arccosine	ACOS(value)	Returns the arccosine (inverse cosine) of a value in radians.	=ACOS(0.5) → 1.0472 radians (60°)
27	Arctangent	ATAN(value)	Returns the arctangent (inverse tangent) of a value in radians.	=ATAN(1) → 0.7854 radians (45°)
28	Sine of Degrees	SIN(DEGREES_TO_RADIANS(deg)) or SIN(rad)	Sine for angles in degrees (convert first).	=SIN(RADIANS(30)) → 0.5
29	Cosine of Degrees	COS(DEGREES_TO_RADIANS(deg)) or COS(rad)	Cosine for angles in degrees.	=COS(RADIANS(60)) → 0.5
30	Tangent of Degrees	TAN(DEGREES_TO_RADIANS(deg)) or TAN(rad)	Tangent for angles in degrees.	=TAN(RADIANS(45)) → 1
31	Arctangent (Two Arguments)	ATAN2(y, x)	Returns the arctangent of y/x, considering quadrant.	=ATAN2(1,1) → 0.7854 radians (45°)
32	Hypotenuse	SQRT(x^2 + y^2)	Calculates hypotenuse in right triangle.	=SQRT(3^2 + 4^2) → 5
33	Pythagorean Sine	Opposite / Hypotenuse	sin θ = opp / hyp.	=3/5 → 0.6 (for 3-4-5 triangle)
34	Pythagorean Cosine	Adjacent / Hypotenuse	cos θ = adj / hyp.	=4/5 → 0.8 (for 3-4-5 triangle)

35	Pythagorean Tangent	Opposite / Adjacent	tan θ = opp / adj.	=3/4 → 0.75 (for 3-4-5 triangle)
36	Sine to Degrees	DEGREES(ASIN(value))	Convert arcsine result to degrees.	=DEGREES(ASIN(0.5)) → 30
37	Cosine to Degrees	DEGREES(ACOS(value))	Convert arccosine result to degrees.	=DEGREES(ACOS(0.5)) → 60
38	Tangent to Degrees	DEGREES(ATAN(value))	Convert arctangent result to degrees.	=DEGREES(ATAN(1)) → 45
39	Radians to Degrees	DEGREES(radians)	Convert radians to degrees.	=DEGREES(PI()/6) → 30
40	Degrees to Radians	RADIANS(degrees)	Convert degrees to radians.	=RADIANS(30) → 0.5236
41	Cotangent	1 / TAN(angle)	Returns the cotangent (1/tan) of an angle.	=1/TAN(RADIANS(45)) → 1

Some More Mathematical Formulas

#	Formula Name	Excel Syntax	Description	Example Usage
42	**Addition**	`=A1 + B1`	Adds two numbers.	`=5 + 3` → 8
43	**Subtraction**	`=A1 - B1`	Subtracts one number from another.	`=10 - 4` → 6
44	**Multiplication**	`=A1 * B1`	Multiplies two numbers.	`=6 * 7` → 42
45	**Division**	`=A1 / B1`	Divides one number by another.	`=15 / 3` → 5
46	**Exponentiation**	`=A1 ^ B1`	Raises a number to a power.	`=2 ^ 3` → 8
47	**Square Root**	`=SQRT(A1)`	Returns the square root.	`=SQRT(16)` → 4
48	**Absolute Value**	`=ABS(A1)`	Returns the absolute value.	`=ABS(-10)` → 10
49	**Integer Part**	`=INT(A1)`	Returns integer part (truncates).	`=INT(8.9)` → 8
50	**Floor**	`=FLOOR(A1, significance)`	Rounds down to multiple.	`=FLOOR(10.7, 5)` → 10
51	**Ceiling**	`=CEILING(A1, significance)`	Rounds up to multiple.	`=CEILING(10.3, 5)` → 15
52	**Modulo**	`=MOD(A1, B1)`	Returns remainder after division.	`=MOD(10, 3)` → 1
53	**Factorial**	`=FACT(A1)`	Returns factorial (n!).	`=FACT(5)` → 120
54	**Pi Constant**	`=PI()`	Returns π ≈ 3.1415926535.	`=PI()*2` → 6.2832
55	**Degrees to Radians**	`=RADIANS(deg)`	Converts degrees to radians.	`=RADIANS(180)` → 3.1416
56	**Radians to Degrees**	`=DEGREES(rad)`	Converts radians to degrees.	`=DEGREES(PI())` → 180

57	**Natural Log**	`=LN(A1)`	Natural logarithm (base e).	`=LN(2.71828)` → ~1
58	**Log Base 10**	`=LOG10(A1)`	Common logarithm.	`=LOG10(100)` → 2
59	**Log Base n**	`=LOG(A1, base)`	Logarithm with custom base.	`=LOG(8, 2)` → 3
29	**Exponential**	`=EXP(A1)`	Returns e raised to power.	`=EXP(1)` → 2.71828
60	**Power**	`=POWER(A1, B1)`	Same as ^ operator.	`=POWER(2, 3)` → 8
61	**Hypotenuse**	`=SQRT(A1^2 + B1^2)`	Length of hypotenuse.	`=SQRT(3^2 + 4^2)` → 5
62	**Median**	`=MEDIAN(A1:A10)`	Middle value in sorted list.	`=MEDIAN(1,3,2)` → 2
63	**Mode**	`=MODE(A1:A10)`	Most frequent value.	`=MODE(1,2,2,3)` → 2
64	**Standard Deviation (Population)**	`=STDEV.P(A1:A10)`	Population standard deviation.	`=STDEV.P(1,2,3,4)` → ~1.118
65	**Standard Deviation (Sample)**	`=STDEV.S(A1:A10)`	Sample standard deviation.	`=STDEV.S(1,2,3,4)` → ~1.291
66	**Variance (Population)**	`=VAR.P(A1:A10)`	Population variance.	`=VAR.P(1,2,3,4)` → 1.25
67	**Variance (Sample)**	`=VAR.S(A1:A10)`	Sample variance.	`=VAR.S(1,2,3,4)` → 1.667
68	**Combinations**	`=COMBIN(n, k)`	Number of ways to choose k from n.	`=COMBIN(5, 2)` → 10

Lookup and Reference Formulas

69 **VLOOKUP:** Looks up a value in a table's first column and returns a value from another column. Searches vertically in the first column of a range and returns a value from a specified column in the same row. Example: `=VLOOKUP(A1, B1:D10, 2, FALSE)`

70 **HLOOKUP**: Searches horizontally in the first row of a range and returns a value from a specified row in the same column. Looks up a value in a table's first row and returns a value from another row.Example: `=HLOOKUP(A1, B1:D10, 2, FALSE)`

71 **INDEX**: Returns a value at a specified row and column in a range.Example: `=INDEX(A1:C10, 2, 3)`

72 **MATCH**: Finds the position of a value in a range.Example: `=MATCH(A1, B1:B10, 0)`

The MATCH function searches for a value in a range and returns its relative position.
Use it with INDEX for flexible lookups (better than VLOOKUP/HLOOKUP).

```excel
=MATCH(lookup_value, lookup_array, [match_type])
```

73 **XLOOKUP**: Searches a range for a value and returns a corresponding value from another range, with flexible options for direction and match type. Advanced lookup for exact or approximate matches (Excel 365/2021+).Example: `=XLOOKUP(A1, B1:B10, C1:C10)`

Syntax

```
excel
=XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])
```

Argument	Description	Required?
`lookup_value`	The value you're searching for	Yes
`lookup_array`	The array or range to search in	Yes
`return_array`	The array or range containing the return value(s)	Yes
`[if_not_found]`	Value to return if no match is found (optional)	No
`[match_mode]`	Specify match type (optional): • `0` = Exact match (default) • `-1` = Exact or next smaller • `1` = Exact or next larger • `2` = Wildcard match (*, ?)	No
`[search_mode]`	Specify search direction (optional): • `1` = First to last (default) • `-1` = Last to first (reverse) • `2` = Binary search (ascending sorted) • `-2` = Binary search (descending sorted)	No

74 **INDIRECT**: Returns a reference specified by a text string.Example: `=INDIRECT("A"&B1)`

75 **OFFSET**: Returns a range offset from a starting cell.Example: `=OFFSET(A1, 2, 3, 5, 5)`

Text Formulas

29 **CONCATENATE** (or **CONCAT**): Combines multiple text strings.Example: `=CONCAT(A1, " ", B1)`

30 **TEXTJOIN**: Combines text with a delimiter (Excel 365/2019+).Example: `=TEXTJOIN(", ", TRUE, A1:A5)`

31 **LEFT**: Extracts characters from the left of a text string.Example: `=LEFT(A1, 3)`

32 **RIGHT**: Extracts characters from the right of a text string.Example: `=RIGHT(A1, 3)`

33 **MID**: Extracts characters from the middle of a text string.Example: `=MID(A1, 2, 3)`

34 **LEN**: Returns the length of a text string.Example: `=LEN(A1)`

35 **TRIM**: Removes extra spaces from text.Example: `=TRIM(A1)`

36 **UPPER**: Converts text to uppercase.Example: `=UPPER(A1)`

37 **LOWER**: Converts text to lowercase.Example: `=LOWER(A1)`

38 **PROPER**: Capitalizes the first letter of each word.Example: `=PROPER(A1)`

39 **TEXT**: Formats a number as text with a specified format.Example: `=TEXT(A1, "dd/mm/yyyy")`

40 **FIND**: Returns the position of a text string within another (case-sensitive).Example: `=FIND("a", A1)`

Lab Week # 7 (Microsoft Excel Lab Work)

Date and Time Formulas

41 **TODAY**: Returns the current date.Example: `=TODAY()`

42 **NOW**: Returns the current date and time.Example: `=NOW()`

43 **DATEDIF**: Calculates the difference between two dates.Example: `=DATEDIF(A1, B1, "d")`

44 **DAY**: Extracts the day from a date.Example: `=DAY(A1)`

45 **MONTH**: Extracts the month from a date.Example: `=MONTH(A1)`

46 **YEAR**: Extracts the year from a date.Example: `=YEAR(A1)`

47 **DATE**: Creates a date from year, month, and day.Example: `=DATE(2023, 10, 26)`

48 **WORKDAY**: Returns a date after a specified number of workdays.Example: `=WORKDAY(A1, 5)`

Financial Formulas

49 **PMT**: Calculates the payment for a loan based on constant payments and interest rate.Example: `=PMT(5%/12, 60, 10000)`

50 **FV**: Calculates the future value of an investment.Example: `=FV(5%/12, 60, -100)`

Lab Week # 6 (Microsoft Excel Lab Work)

WORK TO BE COMPLETED IN LAB

WORK TASIC TO BE COMPLETED IN LAB

WILL BE GIVEN ON WEBPAGE AT THE TIME OF RESPECTIVE LAB

Write Down your Name & Roll # in the Footer Section of the each Page of Document

Please Make Sure, to write down the Name & Roll No in Footer Section of Each Sheet

Lab Week # 7 (Microsoft Excel Lab Work) (Section C)

BMW Sales File
(Odd Roll#)

1. Do a Conditional Formatting based on the Sales Volume Column? Use appropriate range after finding out Max and Minimum and Average Mileage ?
2. Count the no of i8 vehicles in North America i.e. Hybrid or Petrol or Diesel of Electric
3. Do a conditional Formatting (green color) of all values which are Electric Vehicles
4. Count the total no of Manual and Automatic cars in the Excel list
5. How many M5 vehicles were sold in North America during this time in total?
6. Which Model is the most Expensive Car During this time frame
7. Which Model is the most Cheapest Car during this time frame

How Many Silver Color cars which were i8 were sale during this time Frame

Customers
(Even Roll#)

1. Do Conditional Formatting for all customers from Pakistan, Bangladesh, Iran as Green Color.
2. Do Conditional Formatting for all customers from United States , Israel as Blue color
3. Do Conditional Formatting for all customers from Europe using Orange Color. Select all European Countries
4. How many customers had a subscription date in 2022?
5. How many customers had a subscription date from 2020-2021?
6. Find out the total number of customers from Pakistan?
7. Find out the total number of customers from Iran?
8. Find out the total no of subscriptions ? And the highest no of subscriptions done in 2021?

Lab Week # 7 (Microsoft Excel Lab Work) (Section A)

WORK TO BE COMPLETED IN LAB

Products
(Even Roll#)

1. Do Conditional Formatting for all products with Size XL (color blue). Highlight whole row.
2. Do conditional formatting with cell color = Yellow where ever the Category is Home and Kitchen
3. Find out the cheapest item in stock?
4. Find out the item name which has the largest inventory in stock?
5. How many Small Size items are available in stock?
6. What is the total Amount of items available in Store?
7. How many items are out of stock in the list?
8. How many Sky Blue items are available in stock?
9. Make a Sine, cosine Table on a new Sheet and make a 2D Line chart with 0.1 degree increment for whole 0 to 180 degrees.
10. Make.a chart for the Items category indicating which items is available in which quantity? Make a Secondary table enlisting all available categories and available items using XLOOKUP, FIND, MATCH or any associated Formulas?

Mobile

(Odd Roll#)

1 How many mobiles were released in year 2020?
2 Do conditional formatting for all mobiles of Company Apple Make whole row as the color orange?
3 Count the Total no of Mobile phone Launched by Samsung in year 2020
4 What is the number of Mobiles launched by Huawei?
5 How many mobiles were launched between year 2015-2020?
6 Which company has the highest no of Mobiles launched in this document?
7 How many mobiles are there which are only and just based on GSM technology?
8 Make a list of all companies whose names are there in this Inventory? Also write down the no of Mobiles launched by each of that Company?
9 Make a tan, cotangent Table on a new Sheet and make a 2D Line chart with 0.1 degree increment for whole 0 to 180 degrees.
10 Make.a chart for the no of manufacturer indicating which mobile is available in which quantity for all the data given? Make a Secondary table enlisting all available categories and available items using XLOOKUP, FIND, MATCH or any associated Formulas?

Please Make Sure, to write down the Name & Roll No in Footer Section of Each Sheet

1. XLOOKUP – The Official `VLOOKUP` Replacement (Excel 365 / 2021+)

Feature	`VLOOKUP`	`XLOOKUP`
Lookup Direction	Right only	Left **or** Right
Column Index	Needs number	Uses **range reference**
Default Match	Approximate	**Exact**
Not Found	`#N/A`	Custom value
Search Mode	First → Last	Any direction, binary search

Basic Syntax

```
excel
=XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found],
[match_mode], [search_mode])
```

Examples

Goal	Formula
Exact match (default)	`=XLOOKUP(A2, Products!A:A, Products!B:B)`
Return "Not Found"	`=XLOOKUP(A2, Products!A:A, Products!B:B, "Not Found")`
Lookup to the LEFT	`=XLOOKUP(A2, Products!B:B, Products!A:A)`
Approximate match	`=XLOOKUP(A2, Prices!A:A, Prices!B:B, , -1)`
Return multiple columns	`=XLOOKUP(A2, Products!A:A, Products!B:D)`

***Tip**: `XLOOKUP` is **dynamic** — spills multiple columns automatically.*

2. INDEX + MATCH – Classic Flexible Alternative (All Excel Versions)

```
excel
=INDEX(return_range, MATCH(lookup_value, lookup_range, 0))
```

Why Use It?

- Works **left of lookup column**
- No column index errors
- Fully **dynamic**

Examples

Goal	Formula
Lookup Name → Price	`=INDEX(Prices!B:B, MATCH(A2, Prices!A:A, 0))`
Two-way lookup (row + column)	`=INDEX(Table, MATCH(row_val, RowHeaders, 0), MATCH(col_val, ColHeaders, 0))`

3. FILTER – Dynamic Array Replacement (Excel 365)

Replaces `VLOOKUP` when you want **all matching rows**.

```
excel
=FILTER(return_range, lookup_range = lookup_value, "Not Found")
```

Example

```
excel
=FILTER(Products!B:D, Products!A:A = A2, "Not Found")
```

→ Returns **all columns B:D** for matching product in A2.

4. LOOKUP vs XLOOKUP

Function	Use Case
`LOOKUP`	Only for **sorted data**, approximate match
`XLOOKUP`	**Exact or approximate**, any direction

Avoid *`LOOKUP` — `XLOOKUP` is superior.*

5. CHOOSE + MATCH – For Multiple Return Values

```
excel
=CHOOSE({1,2}, INDEX(col1, MATCH(...)), INDEX(col2, MATCH(...)))
```

6. Power Query (Get & Transform) – For Large/Dynamic Data

Step	Action
1	Load both tables into Power Query
2	**Merge Queries** (like VLOOKUP)
3	Expand needed columns
4	Load back to Excel

Best for*: 10k+ rows, frequent updates, multiple sources.*

7. Dynamic Named Ranges + INDIRECT (Legacy)

```
excel
=INDEX(INDIRECT("Table1"), MATCH(A2, INDIRECT("LookupCol"), 0), 2)
```

Avoid if possible — volatile and slow.

8. Comparison Table: Which to Use?

Scenario	Best Function
Excel 365 / 2021+	`XLOOKUP`
Older Excel	`INDEX + MATCH`
Return all matches	`FILTER`
Large datasets	**Power Query**
Horizontal lookup	`HLOOKUP` → Replace with `XLOOKUP`
Approximate match (sorted)	`XLOOKUP(..., , -1)`

Quick Cheat Sheet (Copy-Paste)

```
excel
' 1. XLOOKUP (Exact)
=XLOOKUP(A2, Table1[ID], Table1[Name], "Not Found")

' 2. XLOOKUP (Left Lookup)
=XLOOKUP(A2, Table1[Name], Table1[ID])

' 3. INDEX + MATCH
=INDEX(Table1[Price], MATCH(A2, Table1[ID], 0))

' 4. FILTER (Multiple Rows)
=FILTER(Table1[[Name]:[Price]], Table1[ID]=A2)

' 5. Approximate Match
=XLOOKUP(A2, SortedList, Values, "Below", -1)
```