[Data Analysis in Excel] {CheatSheet}

1. Basic Excel Operations

- **AutoFill**: Drag the fill handle (small square in the bottom right of a cell) to fill cells.
- **Filtering Data**: Select the range → Data → Filter.
- **Sorting Data**: Select the range → Data → Sort.

2. Excel Functions for Basic Arithmetic

- **SUM**: `=SUM(A1:A10)` - Adds all numbers in a range.
- **AVERAGE**: `=AVERAGE(B1:B10)` - Calculates the average of numbers in a range.
- **MIN**: `=MIN(C1:C10)` - Finds the smallest number in a range.
- **MAX**: `=MAX(D1:D10)` - Finds the largest number in a range.
- **SUBTOTAL**: `=SUBTOTAL(1, E1:E10)` - Calculates the sum of a range, ignoring filters.

3. Date and Time Functions

- **TODAY**: `=TODAY()` - Returns the current date.
- **NOW**: `=NOW()` - Returns the current date and time.
- **YEAR**: `=YEAR(F1)` - Extracts the year from a date.
- **MONTH**: `=MONTH(G1)` - Extracts the month from a date.
- **DAY**: `=DAY(H1)` - Extracts the day of the month from a date.

4. Text Functions

- **CONCATENATE/CONCAT**: `=CONCATENATE(A1, B1)` or `=CONCAT(A1, B1)` - Joins two or more text strings.
- **LEFT**: `=LEFT(I1, 3)` - Extracts a given number of characters from the start of a string.
- **RIGHT**: `=RIGHT(J1, 3)` - Extracts a given number of characters from the end of a string.
- **MID**: `=MID(K1, 2, 4)` - Extracts a substring from the middle of a string.

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- **UPPER/LOWER/PROPER**: `=UPPER(L1)`, `=LOWER(L1)`, `=PROPER(L1)` - Changes text to upper, lower, or proper case.

5. Logical Functions

- **IF**: `=IF(M1>10, "Yes", "No")` - Performs a logical test and returns one value for TRUE and another for FALSE.
- **AND/OR**: `=AND(N1>5, O1<10)`, `=OR(P1=1, Q1=2)` - Returns TRUE if all or any of the arguments respectively are TRUE.
- **NOT**: `=NOT(R1)` - Reverses the logic of its argument.
- **IFERROR**: `=IFERROR(S1, "Error")` - Returns a custom result if an error occurs in the formula.

6. Lookup and Reference Functions

- **VLOOKUP**: `=VLOOKUP(T1, A1:B10, 2, FALSE)` - Looks for a value in the first column of a table and returns a value in the same row.
- **HLOOKUP**: `=HLOOKUP(U1, A1:C3, 2, FALSE)` - Looks for a value in the first row of a table.
- **INDEX**: `=INDEX(A1:C10, 3, 2)` - Returns the value of a cell in a specified row and column number.
- **MATCH**: `=MATCH("item", A1:A10, 0)` - Returns the relative position of an item in a range.
- **XLOOKUP** (for newer Excel versions): `=XLOOKUP(V1, A1:A10, B1:B10)` - Searches a range for a match and returns the corresponding item from a second range.

7. Financial Functions

- **PMT**: `=PMT(rate, nper, pv)` - Calculates the payment for a loan based on constant payments and a constant interest rate.
- **FV**: `=FV(rate, nper, pmt)` - Calculates the future value of an investment.
- **NPV**: `=NPV(rate, value1, [value2], ...)` - Calculates the net present value of an investment.
- **IRR**: `=IRR(values)` - Calculates the internal rate of return for a series of cash flows.

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- **XNPV** (for non-periodic cash flows): `=XNPV(rate, values, dates)`

8. Statistical Functions

- **COUNT/COUNTA**: `=COUNT(W1:W10)`, `=COUNTA(X1:X10)` - Counts the number of cells with numbers and non-blank cells.
- **MEDIAN**: `=MEDIAN(Y1:Y10)` - Finds the median of a group of numbers.
- **MODE**: `=MODE(Z1:Z10)` - Returns the most frequently occurring number in a data set.
- **STDEV.P/STDEV.S**: `=STDEV.P(AA1:AA10)` - Calculates the standard deviation for an entire population or a sample.
- **VAR.P/VAR.S**: `=VAR.P(AB1:AB10)` - Calculates the variance for an entire population or a sample.

9. Data Analysis Tools

- **PivotTables**: Insert → PivotTable - Summarizes large amounts of data quickly and flexibly.
- **Data Tables**: Data → What-If Analysis → Data Table - Performs multiple calculations on your data.
- **Solver**: Data → Solver - Finds an optimal value for a formula in one cell.
- **Goal Seek**: Data → What-If Analysis → Goal Seek - Adjusts a value to achieve a desired goal.
- **Scenario Manager**: Data → What-If Analysis → Scenario Manager - Creates and saves different groups of values on a worksheet.

10. Charts and Graphs

- **Creating a Chart**: Insert → Recommended Charts → Select Chart Type.
- **Creating a PivotChart**: Insert → PivotChart.
- **Formatting Charts**: Use Chart Tools for layout and design adjustments.
- **Creating Sparklines**: Insert → Sparklines → Select Type.
- **Conditional Formatting in Charts**: Use the Format Data Series options.

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11. Conditional Formatting

- **Applying Conditional Formatting**: Home → Conditional Formatting.
- **Data Bars/Color Scales/Icon Sets**: Home → Conditional Formatting → Choose a style.
- **Creating Custom Rules**: Home → Conditional Formatting → New Rule.
- **Highlighting Cell Rules**: Home → Conditional Formatting → Highlight Cells Rules.
- **Managing Rules**: Home → Conditional Formatting → Manage Rules.

12. Data Validation

- **Creating Drop-Down Lists**: Data → Data Validation → Allow: List.
- **Setting Number, Date, or Time Ranges**: Data → Data Validation → Allow: Date, Time, or Decimal.
- **Custom Validation Based on a Formula**: Data → Data Validation → Allow: Custom.
- **Creating Input Messages and Error Alerts**: Data → Data Validation → Input Message/Error Alert.

13. Advanced Excel Features

- **Using Power Query (Get & Transform)**: Data → Get Data → Combine Queries.
- **Utilizing Power Pivot**: Manage with the Power Pivot add-in.
- **Using Macro Recorder**: View → Macros → Record Macro.
- **Writing VBA Code**: View → Macros → View Macros → Edit.
- **Using Form Controls**: Developer → Insert → Form Controls.

14. Excel Tables

- **Creating a Table**: Insert → Table or Ctrl + T.
- **Table Slicers for Easy Filtering**: Insert → Slicer.
- **Referencing Table Elements in Formulas**: Use structured references like Table1[Column1].
- **Total Row for Quick Calculations**: Table Tools → Design → Total Row.

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- **Resizing and Formatting Tables**: Table Tools → Design → Resize Table.

15. Advanced Formulas

- **Array Formulas**: Entered with Ctrl + Shift + Enter.
- **Dynamic Arrays (for newer Excel versions)**: `=SORT()`, `=FILTER()`, `=UNIQUE()`.
- **Using INDIRECT for Dynamic References**: `=INDIRECT("A" & 1)`.
- **Combining IF with AND, OR**: `=IF(AND(condition1, condition2), value_if_true, value_if_false)`.
- **Nested IF Statements**: `=IF(condition1, value_if_true1, IF(condition2, value_if_true2, value_if_false2))`.

16. Text and Data Extraction

- **LEFT, RIGHT, MID for Text Extraction**: `=LEFT(text, num_chars)`.
- **SEARCH, FIND for Position of Substring**: `=SEARCH("substr", text)`.
- **TEXTJOIN, CONCAT for Joining Text**: `=TEXTJOIN(delimiter, ignore_empty, text1, [text2], ...)`.
- **TRIM for Removing Extra Spaces**: `=TRIM(text)`.
- **VALUE for Converting Text to Number**: `=VALUE(text)`.
- **SPLIT Text into Columns**: Data → Text to Columns.
- **SUBSTITUTE to Replace Text**: `=SUBSTITUTE(text, old_text, new_text)`.
- **LEN to Get Length of Text**: `=LEN(text)`.

17. Data Import and Connection

- **Import Data from External Sources**: Data → Get Data.
- **Connecting to SQL Databases**: Data → Get Data → From Database.
- **Importing Data from Web**: Data → Get Data → From Web.
- **Refreshing Imported Data**: Data → Refresh All.

18. Working with Large Data

- **Freeze Panes for Easy Navigation**: View → Freeze Panes.
- **Splitting Window**: View → Split.

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- **Using Named Ranges for Easy Reference**: Formulas → Name Manager → New Name.
- **Data Consolidation**: Data → Consolidate.
- **Grouping and Ungrouping Data**: Data → Group.

19. Formulas and Features for Business Analysis

- **NPV and IRR for Financial Analysis**: `=NPV(rate, value1, [value2], ...)`, `=IRR(values)`.
- **PMT for Loan Payments**: `=PMT(rate, nper, pv)`.
- **XNPV and XIRR for Non-Periodic Cash Flows**: `=XNPV(rate, values, dates)`, `=XIRR(values, dates)`.
- **Using Data Tables for Scenario Analysis**: Data → What-If Analysis → Data Table.
- **Break-Even Analysis Formulas**: Custom formulas based on fixed and variable costs.

20. Excel Add-ins for Enhanced Capabilities

- **Using Solver Add-in for Optimization Problems**: Data → Solver.
- **Analysis ToolPak for Statistical Analysis**: Add-ins → Analysis ToolPak.
- **Power Map for Geospatial Analysis**: Insert → 3D Map.
- **Using Power Query for Advanced Data Transformation**: Data → Get & Transform Data.
- **Inquire Add-in for Workbook Analysis and Comparison**: Add-ins → Inquire → Workbook Analysis.

21. Advanced Data Manipulation

- **Flash Fill for Pattern Recognition**: Data → Flash Fill.
- **Using Advanced Filter for Complex Criteria**: Data → Advanced.
- **Remove Duplicates to Clean Data**: Data → Remove Duplicates.
- **Text to Columns for Delimited Data**: Data → Text to Columns.

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22. Custom Formatting

- **Custom Number Formats**: Home → Number → More Number Formats.
- **Conditional Custom Number Formats**: Using custom formats with conditions in the Format Cells dialog.
- **Creating Custom Date Formats**: Customizing date display in Format Cells dialog.
- **Using Color in Custom Formats**: Incorporating font color changes in custom formats.

23. Advanced Formulas and Functions

- **Nested Functions for Complex Calculations**: Combining multiple functions like `IF`, `VLOOKUP`, and `MATCH`.
- **Using INDIRECT for Dynamic Cell Reference**: `=INDIRECT(ref_text)`.
- **OFFSET for Dynamic Range Selection**: `=OFFSET(reference, rows, cols, [height], [width])`.
- **SUMPRODUCT for Multi-Condition Summing**: `=SUMPRODUCT((range1=criteria1)*(range2=criteria2)*sum_range)`.

24. Data Validation and Error Checking

- **Using Data Validation for Controlled Inputs**: Data → Data Validation.
- **Circle Invalid Data**: Data Validation → Circle Invalid Data.
- **Error Checking and Tracing**: Formulas → Error Checking.
- **Tracing Precedents and Dependents**: Formulas → Trace Precedents/Trace Dependents.

25. Using Forms and Controls

- **Creating Forms for Data Entry**: Developer → Insert → Form Controls.
- **Using Spin Button for Incremental Change**: Inserting a spin button and linking it to a cell.
- **Check Boxes for Binary Choices**: Using check boxes for Yes/No selections.

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- **Option Buttons for Multiple Choice**: Grouping option buttons for single-choice selection.

26. PivotTable Advanced Techniques

- **Calculated Fields in PivotTables**: Analyze → Fields, Items, & Sets → Calculated Field.
- **Grouping Data in PivotTables**: Right-click on a field item → Group.
- **PivotTable Slicers for Interactive Filtering**: Analyze → Insert Slicer.
- **PivotTable Timelines for Date Filtering**: Analyze → Insert Timeline.

27. Advanced Charting Techniques

- **Combination Charts for Mixed Data Types**: Creating charts with multiple axis types.
- **Secondary Axis for Comparison**: Format Data Series → Plot Series On → Secondary Axis.
- **Dynamic Charts with OFFSET and Named Ranges**: Using named formulas to create dynamic charts.
- **Creating Waterfall Charts for Financial Analysis**: Insert → Waterfall Chart.

28. Macros and VBA for Automation

- **Recording Macros for Repetitive Tasks**: View → Macros → Record Macro.
- **Editing Macros in VBA Editor**: View → Macros → View Macros → Edit.
- **Writing Custom VBA Functions**: Implementing user-defined functions in VBA.
- **Automating Data Analysis with VBA**: Writing scripts to automate complex data analysis tasks.

29. Advanced Statistical Analysis

- **ANOVA with Analysis ToolPak**: Data Analysis → ANOVA.

- **Regression Analysis**: Data Analysis → Regression.
- **Correlation Analysis**: Data Analysis → Correlation.
- **Descriptive Statistics**: Data Analysis → Descriptive Statistics.

30. Power Tools for Data Analysis

- **Introduction to Power Query for Data Transformation**: Data → Get & Transform Data.
- **Using Power Pivot for Data Modeling**: Managing Data Model in Power Pivot.
- **DAX (Data Analysis Expressions) in Power Pivot**: Writing DAX formulas for advanced calculations.
- **Creating Interactive Dashboards with Power BI**: Using Power BI integration for dynamic reporting.

31. Excel Connectivity

- **Connecting to External Databases**: Data → Get Data → From Database.
- **Using ODBC for Data Import**: Data → Get Data → From Other Sources → From ODBC.
- **Linking Excel with Other Office Applications**: Embedding and linking objects with Word, PowerPoint.
- **Web Queries to Import Data from the Web**: Data → Get Data → From Web.

32. Excel Options and Customization

- **Customizing the Ribbon**: Right-click the Ribbon → Customize the Ribbon.
- **Changing Excel Options and Defaults**: File → Options.
- **Setting Excel Add-ins**: File → Options → Add-ins.
- **Creating Custom Templates for Reuse**: Saving a workbook as an Excel Template (.xltx).

33. Excel Tips for Large Data Sets

- **Optimizing Performance for Large Workbooks**: Best practices like avoiding volatile functions, minimizing used range.
- **Breaking Down Large Workbooks**: Splitting data into multiple sheets or files to improve performance.