Formulas and Functions in Excel

Introduction to Formulas

A **formula** in Excel is an expression used to perform calculations on data. Formulas always start with an equal sign = followed by numbers, cell references, or functions.

**Example:**

=A1 + B1  
This formula adds the values in cells A1 and B1.

**Creating Formulas using Operators**

Operators define how values interact within a formula.

**Types of Operators:**

1. **Arithmetic Operators:** Used for basic mathematical operations.
   * + (Addition)
   * - (Subtraction)
   * \* (Multiplication)
   * / (Division)
   * ^ (Exponentiation)
2. **Comparison Operators:** Used for logical tests.
   * = (Equal to)
   * > (Greater than)
   * < (Less than)
   * >= (Greater than or equal to)
   * <= (Less than or equal to)
   * <> (Not equal to)
3. **Text Concatenation Operator:**
   * & (Joins text values together)
4. **Reference Operators:**
   * : (Range) – Example: SUM(A1:A5)
   * , (Union) – Example: SUM(A1, B1, C1)

**Example Dataset:**

| **A** | **B** | **C** |
| --- | --- | --- |
| 10 | 20 | =A1+B1 (Result: 30) |
| 15 | 25 | =A2\*B2 (Result: 375) |
| 8 | 4 | =A3/B3 (Result: 2) |

**AutoSum**

The **AutoSum** feature automatically calculates the sum of a range of cells. It is available in the **Formulas** tab.

**Example:**

Selecting cells **A1:A5** and clicking **AutoSum** (∑) will insert the formula: =SUM(A1:A5)

**Common Formulas**

1. **SUM:** Adds a range of numbers.  
   =SUM(A1:A5)
2. **AVERAGE:** Finds the mean of a range.  
   =AVERAGE(A1:A5)
3. **MAX:** Returns the highest value in a range.  
   =MAX(A1:A5)
4. **MIN:** Returns the lowest value in a range.  
   =MIN(A1:A5)
5. **COUNT:** Counts numeric values in a range.  
   =COUNT(A1:A5)
6. **IF:** Performs a logical test.  
   =IF(A1>10, "High", "Low")

**Formulas Tab**

The **Formulas Tab** in Excel provides access to:

* Function Library (Financial, Logical, Text, Date & Time, Math & Trig, etc.)
* Named Ranges
* Formula Auditing Tools (Trace Precedents, Evaluate Formula, etc.)

**Copying Formulas**

When copying a formula, Excel automatically adjusts cell references based on:

* **Relative References** (e.g., =A1+B1 adjusts when copied)
* **Absolute References** (e.g., $A$1+B1 does not change when copied)
* **Mixed References** (e.g., $A1+B$1 adjusts partially)

**Date Functions**

1. **TODAY():** Returns the current date.  
   =TODAY()
2. **NOW():** Returns the current date and time.  
   =NOW()
3. **DAY(), MONTH(), YEAR():** Extracts respective parts from a date.  
   =DAY(A1), =MONTH(A1), =YEAR(A1)
4. **DATEDIF():** Finds the difference between two dates. =DATEDIF(A1, B1, "Y") (Years difference)

**Example Dataset:**

| **A (Start Date)** | **B (End Date)** | **C (Days Difference)** |
| --- | --- | --- |
| 01/01/2023 | 15/01/2023 | =DATEDIF(A2,B2,"D") (Result: 14) |

**Text Functions**

1. **LEFT():** Extracts characters from the left.  
   =LEFT(A1, 4)
2. **RIGHT():** Extracts characters from the right.  
   =RIGHT(A1, 3)
3. **MID():** Extracts characters from the middle.  
   =MID(A1, 2, 3)
4. **LEN():** Returns the length of a string.  
   =LEN(A1)
5. **TRIM():** Removes extra spaces.  
   =TRIM(A1)
6. **CONCATENATE() or CONCAT():** Joins multiple text strings.  
   =CONCATENATE(A1, " ", B1) (or =A1 & " " & B1)

**Example Dataset:**

| **A (First Name)** | **B (Last Name)** | **C (Full Name)** |
| --- | --- | --- |
| John | Doe | =A1 & " " & B1 (Result: John Doe) |

**Assignment**

1. **Basic Arithmetic:**
   * Create formulas for addition, subtraction, multiplication, and division using a dataset.
2. **AutoSum:**
   * Use the AutoSum function to calculate the total sales of 5 products.
3. **Common Formulas:**
   * Find the sum, average, max, and min of a given dataset.
4. **Date Functions:**
   * Use TODAY(), YEAR(), and DATEDIF() on date values.
5. **Text Functions:**
   * Extract first names using LEFT() and combine names using CONCAT().

These exercises will help reinforce your understanding of formulas and functions in Excel.