Documentation OF Functions and their applications, including the classic **INDEX-MATCH** combination and the modern **XLOOKUP**.

**The INDEX Function**

The **INDEX** function is a core lookup tool that returns a value from a specified cell within a range. Think of it as a coordinate system for your data.

**Syntax:** INDEX(array, row\_num, [column\_num])

* **array:** The range of cells containing the data.
* **row\_num:** The row number within the array from which to return a value.
* **[column\_num]** (optional): The column number within the array from which to return a value. This is only needed if your array has more than one column.

Example:

To find the value in the 3rd row of the range A1:A10, the formula would be INDEX(A1:A10, 3). The function would return the value in cell A3.

**The MATCH Function**

The **MATCH** function is a locator that finds the position of a specific value within a one-dimensional range (a single row or column). It returns the *position number*, not the value itself.

**Syntax:** MATCH(lookup\_value, lookup\_array, [match\_type])

* **lookup\_value:** The value you're searching for.
* **lookup\_array:** The range where you want to search. This must be a single row or column.
* **[match\_type]** (optional):
  + **0 (Exact Match):** The most common and recommended option. It finds an exact match for your lookup\_value.
  + **1 (Less Than):** Finds the largest value that is less than or equal to the lookup\_value. The lookup\_array **must be sorted in ascending order.**
  + **-1 (Greater Than):** Finds the smallest value that is greater than or equal to the lookup\_value. The lookup\_array **must be sorted in descending order.**

Example:

To find the position of "Banana" in the range B2:B10, the formula would be MATCH("Banana", B2:B10, 0). If "Banana" is in cell B5, the function will return the number 4, because it is the 4th item in the range B2:B10.

**INDEX-MATCH: The Dynamic Duo**

Combining **INDEX** and **MATCH** creates a powerful and flexible lookup formula. The MATCH function first finds the position of the data you want to look up, and the INDEX function then uses that position to retrieve the corresponding value from another range. This is superior to VLOOKUP because it's more flexible and efficient.

**Syntax:** INDEX(return\_array, MATCH(lookup\_value, lookup\_array, 0))

* **return\_array:** The column of data from which you want to retrieve a value.
* **lookup\_value:** The value you are searching for.
* **lookup\_array:** The column where the lookup\_value is located.

Example:

You have a table with a product list in column A and their prices in column C. To find the price of "Product Z," you would use:

=INDEX(C2:C100, MATCH("Product Z", A2:A100, 0))

This formula first finds "Product Z" in column A using MATCH and returns its row number. Then, INDEX uses that row number to retrieve the price from the same row in column C.

**Advantages of INDEX-MATCH:**

* **Directional Freedom:** Unlike VLOOKUP, **INDEX-MATCH** can look up data to the **left** of the lookup column.
* **Efficiency:** It only processes the specific lookup and return columns, making it faster on large datasets.
* **Stability:** Inserting a new column between your lookup and return columns won't break the formula.

**XLOOKUP: The Modern Standard**

**XLOOKUP** is a single, modern function that simplifies and improves upon the functionality of both VLOOKUP and **INDEX-MATCH**. It is now the recommended lookup function for most scenarios.

**Syntax:** XLOOKUP(lookup\_value, lookup\_array, return\_array, [if\_not\_found], [match\_mode], [search\_mode])

* **lookup\_value:** The value to find.
* **lookup\_array:** The range to search in.
* **return\_array:** The range to return a value from.
* **[if\_not\_found]** (optional): The value to return if nothing is found (e.g., "Not Found"). This prevents common #N/A errors.
* **[match\_mode]** (optional): Specifies the type of match. **0 (Exact Match)** is the default and most common setting.
* **[search\_mode]** (optional): Specifies the search direction. **1 (First to Last)** is the default. **-1** searches from the bottom up.

Example:

Using the same product and price table, to find the price of "Product Z" using XLOOKUP:

=XLOOKUP("Product Z", A2:A100, C2:C100, "Product Not Found")

This one function does the job of the entire INDEX-MATCH formula, and it also handles the "not found" scenario gracefully, a feature that would require a separate IFERROR function with INDEX-MATCH.

**Advantages of XLOOKUP:**

* **Simplicity:** A single, intuitive function that is easy to write and understand.
* **Built-in Error Handling:** The if\_not\_found argument eliminates the need for IFERROR.
* **Flexible Search:** It can search from top to bottom or bottom to top.
* **Default Exact Match:** Unlike VLOOKUP, it defaults to an exact match, reducing the chance of errors.