



Macro Programming

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Advanced Data Manipulation Techniques

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Introduction

- Raw data often has skewness, inconsistencies, or scaling issues.
- Advanced techniques make data **comparable, normalized, and analysis-ready**.
- Used in:
 - Data cleaning
 - Preprocessing for dashboards
 - Statistical analysis



Data Transformation

Logarithmic Transformation: `=LOG(cell)`

- Example: `=LOG(B2)` → reduces skewness in Sales data.

Power Transformation: `=POWER(cell, exponent)`

- Example: `=POWER(B2, 2)` → squares the value.

Inverse Transformation: `=1 / B2`

Example: Useful for reciprocal relationships (e.g., speed → time).



Standardization

Formula: `=STANDARDIZE(cell, mean, standard_dev)`

Converts data into a standard scale (Z-scores).

Example:

`=STANDARDIZE (B2 , AVERAGE (B2 : B10) , STDEV (B2 : B10))`

Use case: Compare products with different sales ranges.



Normalization

1. Min-Max Normalization

- Formula:
$$=(\text{cell} - \text{MIN}(\text{range})) / (\text{MAX}(\text{range}) - \text{MIN}(\text{range}))$$
- Scales values between **0 and 1**.

2. Z-Score Normalization

- Formula:
$$=(\text{cell} - \text{AVERAGE}(\text{range})) / \text{STDEV}(\text{range})$$
- Centers data around mean (0) with unit variance.



Data Type Conversion

- **Text to Number:** `=VALUE(A2)`
- **Number to Text:** `=TEXT(A2, "0.00")`
- **Date Conversion:** `=DATEVALUE("01-Jan-2023")`
- Example: Converting imported text dates into usable Excel date format.



Date to Quarter Conversion

- Formula: `=ROUNDUP(MONTH(Date)/3, 0)`
- Example:
 - a. Date = `15-Apr-2023` → Output = **2 (Q2)**
 - b. Date = `10-Nov-2023` → Output = **4 (Q4)**



Practical Activity

	A	B	C	D
1	Date	Product	Sales	Region
2	01/01/23	A	1000	North
3	02/01/23	B	50000	South
4	03/01/23	C	1200	East
5	04/01/23	D	800	West



Apply:

- **Log Transformation** on Sales
- **Min-Max Normalization** across Sales
- **Convert Date** → **Quarter**



Summary

- **Transformation:** Reduce skewness (LOG, POWER).
- **Standardization & Normalization:** Compare data fairly.
- **Type Conversion:** Ensure correct data formats.
- **Quarter Conversion:** Enable seasonal analysis.



THANK YOU

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