# NumPy, Pandas, and Matplotlib Practice Worksheet (Pareto Principle Based)

This worksheet is designed to help you master the most important 20% of NumPy, Pandas, and Matplotlib concepts that will give you 80% of the practical benefits.

The exercises are divided into three sections, each focused on a core library. Each task is followed by a description of the concept being tested. Datasets are included or simulated for practice.

## Section 1: NumPy

### 1. Array Creation and Manipulation

Task: Create a 2D NumPy array of shape (3,4) filled with random integers. Slice the second row. Change all even elements to 0.

### 2. Array Math Operations

Task: Create two arrays and perform element-wise addition, subtraction, and multiplication. Also compute dot product and mean of the result.

### 3. Boolean Indexing and Masking

Task: Create an array and filter all elements greater than a certain value. Replace them with a fixed number.

## Section 2: Pandas

### 1. Creating DataFrames

Task: Create a DataFrame from a dictionary. Include columns like Name, Age, Salary. Display first 5 rows.

### 2. Filtering and Sorting

Task: Filter all rows where Age > 30. Sort the DataFrame by Salary in descending order.

### 3. GroupBy and Aggregation

Task: Group the DataFrame by a categorical column (e.g., Department) and calculate the mean salary.

### 4. Handling Missing Values

Task: Introduce some NaN values in the Salary column. Fill them with the column mean.

### 5. Merging and Joining

Task: Merge two DataFrames on a common column like Employee ID.

## Section 3: Matplotlib

### 1. Line Plot

Task: Plot a simple line graph showing stock prices over time.

### 2. Bar Chart

Task: Create a bar chart showing average salaries by department.

### 3. Histogram

Task: Create a histogram of employee ages.

### 4. Scatter Plot

Task: Plot a scatter plot of Age vs Salary.

### 5. Customization

Task: Customize your plots with titles, axis labels, legends, and grid.