NumPy and Matplotlib Question Bank

# 📘 NumPy Question Bank

* 1. Create a NumPy array of integers from 1 to 20. Reshape it into a 4x5 matrix.
* 2. Find the mean, median, and standard deviation of a NumPy array.
* 3. Generate a 5x5 array of random integers between 10 and 50. Find the max and min values along rows and columns.
* 4. Create a NumPy array of 100 normally distributed random numbers. Plot its histogram using Matplotlib.
* 5. Find all the even numbers in a NumPy array and replace them with -1.
* 6. Create a 6x6 identity matrix and multiply it with a 6x1 vector.
* 7. Flatten a 2D NumPy array and sort it.
* 8. Broadcast a 1D array across a 2D array and compute their element-wise sum.
* 9. Perform element-wise multiplication of two matrices using NumPy dot product.
* 10. Create a 10x10 matrix with values from 1 to 100, and extract the border elements and the inner matrix separately.

# 📘 Matplotlib Question Bank

* 1. Plot a line graph for the following data:  
    
   df = pd.DataFrame({'Year': [2018, 2019, 2020, 2021, 2022], 'Sales': [250, 270, 300, 310, 400]})
* 2. Plot a bar chart showing the population of 5 cities:  
    
   df = pd.DataFrame({'City': ['Delhi', 'Mumbai', 'Chennai', 'Kolkata', 'Bangalore'], 'Population': [19000000, 21000000, 8000000, 15000000, 12000000]})
* 3. Plot a pie chart showing market share of 4 smartphone brands.
* 4. Create a subplot with two graphs — one showing monthly sales, and one showing monthly profit:  
    
   df = pd.DataFrame({'Month': ['Jan', 'Feb', 'Mar', 'Apr', 'May'], 'Sales': [100, 120, 130, 90, 110], 'Profit': [30, 40, 50, 20, 35]})
* 5. Plot a scatter plot of height vs weight and color the points by gender:  
    
   df = pd.DataFrame({'Height': [150, 160, 170, 180, 190], 'Weight': [60, 65, 72, 80, 90], 'Gender': ['M', 'F', 'M', 'F', 'M']})
* 6. Create a line chart with markers, custom colors, labels, and grid.
* 7. Plot multiple lines on the same plot with legends for each.
* 8. Create a histogram of exam scores and annotate the mean score.
* 9. Use plt.subplots() to create a 2x2 grid of different chart types (line, bar, scatter, pie).

/// answer to question no 5 if found difficult

import matplotlib.pyplot as plt

# Sample data

df = pd.DataFrame({

'Height': [150, 160, 170, 180, 190],

'Weight': [60, 65, 72, 80, 90],

'Gender': ['M', 'F', 'M', 'F', 'M']

})

# Plot

plt.figure(figsize=(8, 6))

# Scatter plot for Male

male = df[df['Gender'] == 'M']

plt.scatter(male['Height'], male['Weight'], color='blue', label='Male', marker='o')

# Scatter plot for Female

female = df[df['Gender'] == 'F']

plt.scatter(female['Height'], female['Weight'], color='red', label='Female', marker='^')

# Labels and Title

plt.xlabel('Height (cm)')

plt.ylabel('Weight (kg)')

plt.title('Height vs Weight by Gender')

plt.legend()

plt.grid(True)

# Show plot

plt.show()