# Q1) Operations on a NumPy Array

import numpy as np  
  
# Initialize a 3x3 NumPy array with integer values  
array = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])  
  
# Multiply the entire array by 2  
multiplied\_array = array \* 2  
  
# Add 5 to each element of the array  
added\_array = multiplied\_array + 5  
  
# Calculate the square of each element in the array  
squared\_array = np.square(added\_array)  
  
# Print the original array and the results of each operation  
print("Original Array:")  
print(array)  
print("\nArray after multiplying by 2:")  
print(multiplied\_array)  
print("\nArray after adding 5:")  
print(added\_array)  
print("\nArray after squaring each element:")  
print(squared\_array)

# Q2) Slicing Operations on a NumPy Array

import numpy as np  
  
# Initialize a 3x3 NumPy array with integer values  
array = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])  
  
# Extract the first row of the array  
first\_row = array[0, :]  
  
# Extract the last column of the array  
last\_column = array[:, -1]  
  
# Extract a 2x2 sub-array from the center of the original array  
center\_subarray = array[1:3, 1:3]  
  
# Print the results of the slicing operations  
print("Original Array:")  
print(array)  
print("\nFirst row of the array:")  
print(first\_row)  
print("\nLast column of the array:")  
print(last\_column)  
print("\n2x2 sub-array from the center:")  
print(center\_subarray)

# Q3) DataFrame for Students' Names and Marks

import pandas as pd  
  
# Create a DataFrame to store names and marks of 10 students  
data = {  
 'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eva', 'Frank', 'Grace', 'Hannah', 'Ivan', 'Jack'],  
 'Marks': [85, 92, 78, 90, 88, 76, 95, 89, 77, 84]  
}  
  
df\_students = pd.DataFrame(data)  
  
# Print the DataFrame  
print("DataFrame of Students' Names and Marks:")  
print(df\_students)

# Q4) DataFrame for Employees' Names and Incomes

import pandas as pd  
  
# Create a DataFrame to store names and incomes of 5 employees  
data = {  
 'Employee\_name': ['John', 'Emma', 'Robert', 'Sophia', 'Michael'],  
 'Income': [70000, 80000, 75000, 82000, 78000]  
}  
  
df\_employees = pd.DataFrame(data, index=['a', 'b', 'c', 'd', 'e'])  
  
# Print the DataFrame  
print("DataFrame of Employees' Names and Incomes:")  
print(df\_employees)

# Q5) Bar Plot for Frequency of Occurrences

import matplotlib.pyplot as plt  
  
# Dataset representing the frequency of occurrences  
x = ['A', 'B', 'C', 'D', 'E']  
y = [10, 20, 15, 25, 30]  
  
# Create a bar plot  
plt.bar(x, y, color='blue')  
  
# Set titles and labels  
plt.title('Frequency of Occurrences')  
plt.xlabel('Categories')  
plt.ylabel('Frequency')  
  
# Display the plot  
plt.show()