1. **We write a program to plot a line graph representing the temperature readings over a week: 20, 22, 19, 23, 21, 24, 20.**

**Answer**

import matplotlib.pyplot as plt

**# Temperature data**

days = ['Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat', 'Sun']

temperatures = [20, 22, 19, 23, 21, 24, 20]

**# Create plot**

plt.figure(figsize=(8, 4))

plt.plot(days, temperatures, marker='o', color='red', linestyle='-')

**# Add labels and title**

plt.title('Weekly Temperature Readings')

plt.xlabel('Day of Week')

plt.ylabel('Temperature (°C)')

plt.grid(True)

**# Show plot**

plt.show()

b) **Write a program to generate the arithmetic sequence starting at 5 with a common difference of 3, for 8 terms**

**Answer**

**# Arithmetic sequence parameters**

start = 5

difference = 3

terms = 8

**# Generate sequence**

sequence = [start + i \* difference for i in range(terms)]

print("Arithmetic sequence:", sequence)

1. **Write a program to calculate the volume under the surface z = x^2 + y^2 over square region 0 < equal to x, y < equal to 1.**

**Answer**

**import numpy as np**

from scipy.integrate import dblquad

**# Define the function z = x^2 + y^2**

def func(y, x):

return x\*\*2 + y\*\*2

**# Define integration limits (0 to 1 for both x and y)**

x\_lower, x\_upper = 0, 1

y\_lower, y\_upper = 0, 1

**# Calculate the volume using double integration**

volume, error = dblquad(func, x\_lower, x\_upper, lambda x: y\_lower, lambda x: y\_upper)

print(f"Volume under the surface: {volume:.4f}")

print(f"Estimated error: {error:.2e}")