Prac-5

#WAP to find Global Optimal Solution of a function 𝑓(𝑥) = −10𝐶𝑜𝑠(𝜋𝑥 − 2.2) + (𝑥 + 1.5)𝑥 graphically

import numpy as np

import matplotlib.pyplot as plt

# Define the function

def objective\_function(x):

  return -10 \* np.cos(np.pi \* x - 2.2) + (x + 1.5) \* x

# Generate x values

x\_values = np.linspace(-5, 5, 1000)

# Calculate corresponding y values

y\_values = objective\_function(x\_values)

# Plot the function

plt.plot(x\_values, y\_values, label='f(x) = -10 \* cos(pi \* x - 2.2) + (x + 1.5) \* x')

plt.xlabel('x')

plt.ylabel('f(x)')

plt.title('Graph of the Objective Function')

plt.axhline(0, color='black', linewidth=0.5, linestyle='--', label='y=0')

# Add a horizontal line at y=0

plt.legend()

# Highlight the global minimum (maximum) point

global\_min\_index = np.argmin(y\_values)

global\_max\_index = np.argmax(y\_values)

plt.scatter(x\_values[global\_min\_index], y\_values[global\_min\_index], color='red', marker='o', label='Global Minimum')

plt.scatter(x\_values[global\_max\_index], y\_values[global\_max\_index], color='blue', marker='o', label='Global Maximum')

# Show the plot

plt.show()

