Name :

Assignment No 4 - Implement Gradient Descent Algorithm to find the local minima of a function. For example, find the local minima of the function y=(x+3)² starting from the point x=2.

import numpy as np

import matplotlib.pyplot as plt

def f(x):

return (x+3)\*\*2

def df(x):

return 2\*x + 6

def gradient\_descent(initial\_x, learning\_rate, num\_iterations): x = initial\_x

x\_history = [x]

for i in range(num\_iterations): gradient = df(x)

x = x - learning\_rate \* gradient x\_history.append(x)

return x, x\_history initial\_x = 2

learning\_rate = 0.1

num\_iterations = 50

x, x\_history = gradient\_descent(initial\_x, learning\_rate, num\_iterations)

print("Local minimum: {:.2f}".format(x))

Local minimum: -3.00

*#Create a range of x values to plot*

x\_vals = np.linspace(-1, 5, 100)

*#Plot the function f(x)*

plt.plot(x\_vals, f(x\_vals))

*# Plot the values of x at each iteration*

plt.plot(x\_history, f(np.array(x\_history)), 'rx')

*#Label the axes and add a title*

plt.xlabel('x')

plt.ylabel('f(x)') plt.title('Gradient Descent')

*#Show the plot*

plt.show()

