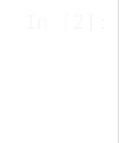


*#Name: Atharva satunkar*

*#Roll no: COBB073*



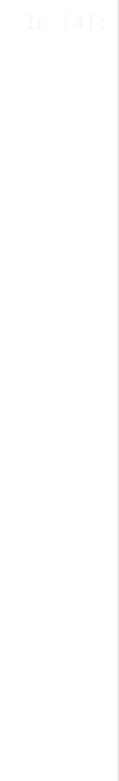
**import** pandas **as** pd **import** numpy **as** np **import** seaborn **as** sns

**import** matplotlib.pyplot **as** plt

**from** sympy **import** Symbol, lambdify



x **=** Symbol('x')



**def** gradient\_descent(

function, start, learn\_rate, n\_iter**=**10000, tolerance**=**1e-06, step\_size**=**1

):

gradient **=** lambdify(x, function**.**diff(x)) function **=** lambdify(x, function)

points **=** [start] iters **=** 0

**while** step\_size **>** tolerance **and** iters **<** n\_iter: prev\_x **=** start

start **=** start **-** learn\_rate **\*** gradient(prev\_x) step\_size **=** abs(start **-** prev\_x)

iters **=** iters**+**1 points**.**append(start)

print("The local minimum occurs at", start)

*# Create plotting array* x\_ **=** np**.**linspace(**-**7,5,100) y **=** function(x\_)

*# setting the axes at the centre*

fig **=** plt**.**figure(figsize **=** (10, 10))

ax **=** fig**.**add\_subplot(1, 1, 1) ax**.**spines['left']**.**set\_position('center') ax**.**spines['bottom']**.**set\_position('zero') ax**.**spines['right']**.**set\_color('none') ax**.**spines['top']**.**set\_color('none') ax**.**xaxis**.**set\_ticks\_position('bottom') ax**.**yaxis**.**set\_ticks\_position('left')

*# plot the function*

plt**.**plot(x\_,y, 'r')

plt**.**plot(points, function(np**.**array(points)), '-o')

*# show the plot*

plt**.**show()

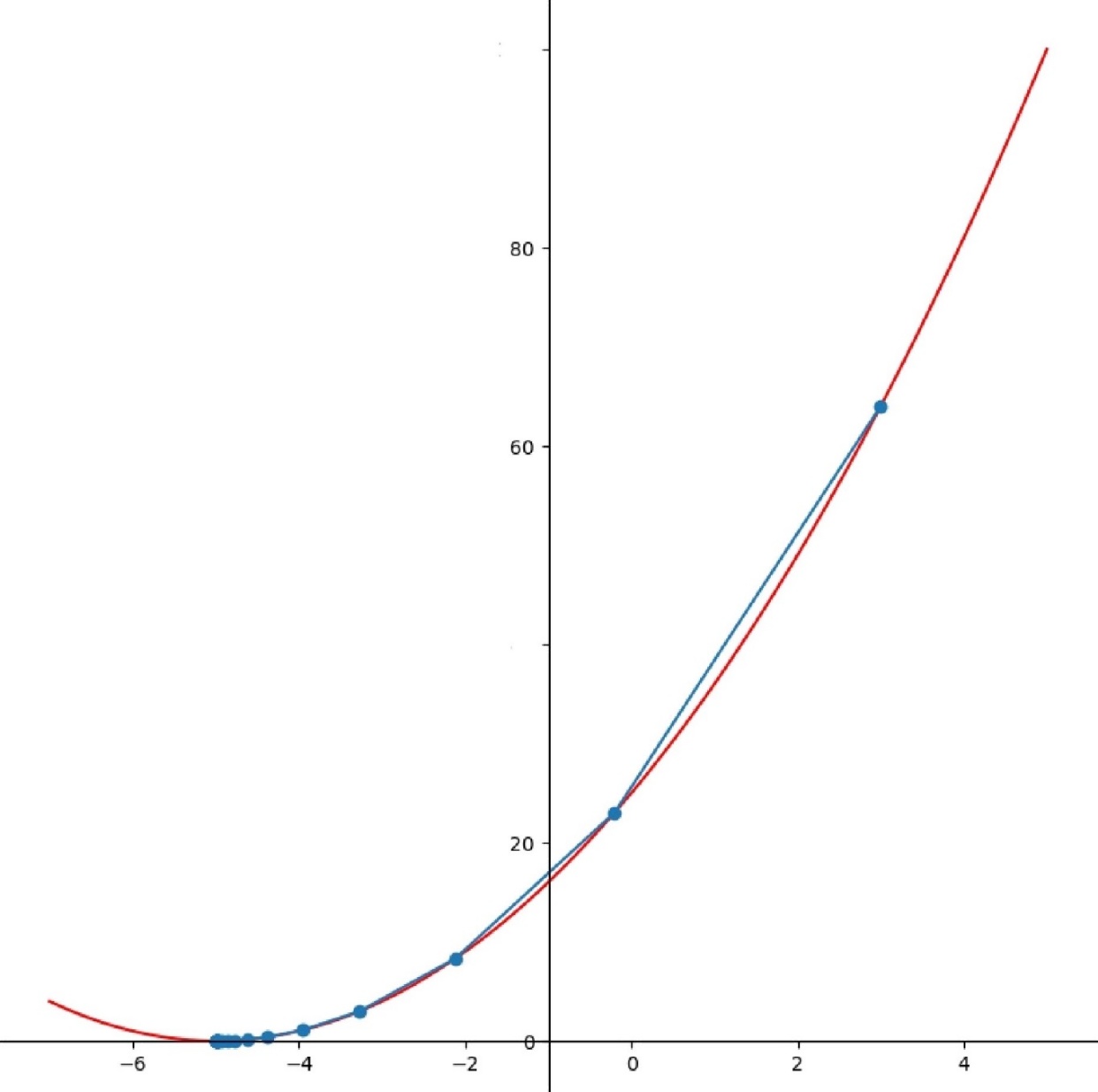


function**=**(x**+**5)**\*\***2 gradient\_descent(

function**=**function, start**=**3.0, learn\_rate**=**0.2, n\_iter**=**50

)

The local minimum occurs at -4.999998938845185



lDO

4D

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