

Optimization

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we have to obtain the maximum value of $x^{25}(1-x)^{75}$ in the interval $[0,1]$. this can be seen figure $f(x)$.

1

objective function:

2

$$f(x) = \max_x (x^{25}(1-x)^{75}) \quad (1)$$

2

(2)

2

constraints

$$0 < x < 1 \quad (3)$$

1 Problem Statement

On the interval $[0,1]$ the function $x^{25}(1-x)^{75}$ takes its maximum value at point ?

using **gradient ascent** method we can find its maxima in the interval $[0,1]$.

2 Solution

Given,

$$f(x) = x^{25}(1-x)^{75}$$

$$f'(x) = 25x^{24}(1-x)^{74}(1-4x)$$

$$x_{n+1} = x_n + \alpha \nabla f(x_n) \quad (4)$$

$$\Rightarrow x_{n+1} = x_n + \alpha(25x^{24}(1-x)^{74}(1-4x)) \quad (5)$$

Taking $x_0 = 0.25\alpha = 0.001$ and precision = 0.00000001, values obtained using python are:

5 Conclusion

Maxima = 3.785253

Maxima Point = 0.25

- (6) We found the maxima and maximum value
(7) at the point .

3 Construction

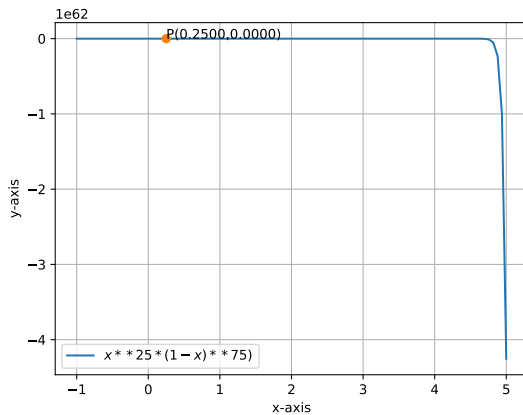


Figure 1: using gradient ascent method

4 Software

Download the following code using,

[https://github.com/imran111888/fwc2/tree/main/optimization assignment](https://github.com/imran111888/fwc2/tree/main/optimization%20assignment)

and execute the code by using command

Python3 opt.py