

Optimization(1) Assignment

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September 2022

Problem Statement -The function $f(x)=x/2+2/x$ has a local minimum at .

Figure

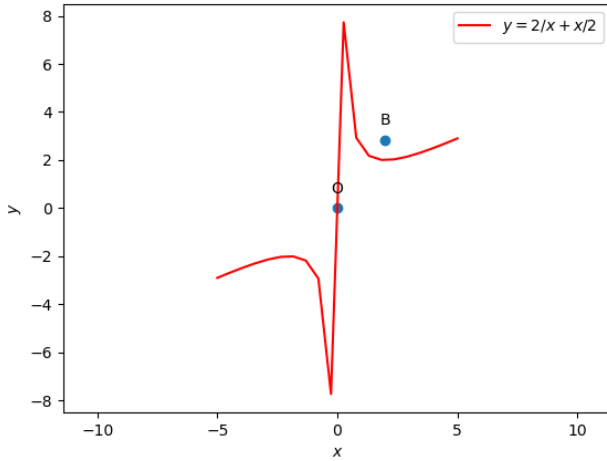


Figure 1: Graph of $f(x)$

Solution

Gradient descent

$$f(x) = x/2 + 2/x \quad (1)$$

$$f'(x) = 1/2 - 2/x^2 \quad (2)$$

we have to attain the minimum value of $x/2+2/x$ in the interval . This can be seen in Figure $f(x)$.Using gradient descent method we can find its minima in the interval

$$x_{n+1} = x_n - \alpha \nabla f(x_n) \quad (3)$$

$$\implies x_{n+1} = x_n - \alpha(1/2 - 2/x^2) \quad (4)$$

Taking $x_0 = 0.5, \alpha = 0.001$ and precision = 0.00000001, values obtained using python are:

$$\boxed{\text{Minima} = 2.23} \quad (5)$$

$$\boxed{\text{Minima Point}} = 2.012340 \quad (6)$$

$$(7)$$