18KU1A0474

find global minimum point and value for function.

$f(x) = x^4 + 3x^2 + 10.$

Given $f(x) = x^4 + 3x^2 + 10.$

Step-1 :- Initialize variables.

$x = 1$

$\eta = 0.1$

epoches = 2.

Step-2 :- First order derivative of $f(x)$ at $x = 1$

$$\left(\frac{\partial f}{\partial x}\right)_{x=1} = (4x^3 + 6x),$$

$$= 4(1) + 6(1)$$

$$= \underline{10}$$

Step-3 :- calculate change in x

$$\Delta x = -\eta \frac{\partial f}{\partial x}.$$

$$= -(0.1)(10)$$

$$= \underline{-1}.$$

Step-4:- Update variable x.

$$x = x + \Delta x$$
$$= 1 + (-1)$$
$$= 0.$$

Step-5:- Increment iterations.

$$itr = itr + 1$$

Step-6:- if (iteration > epoches) then go to step-7.

else, go to step-2.

here, itr = 2, epoches = 2

$2 > 2 \rightarrow$ false.

go to step-2.

Step-2:- first order derivative of $f(x)$ at $x = 0$

$$\left(\frac{\partial f}{\partial x}\right)_{x=0} = (4x^3 + 6x)_0$$
$$= 0.$$

Step-3:- Calculate change in x

$$\Delta x = -\eta \frac{\partial f}{\partial x}$$
$$= -(0.1)\,0$$
$$= 0.$$

Step-4:- Update variable x.

$x = x + \Delta x$

$= 0 + (0)4$

$= 0.$

Step-5 :- Increment iterations.

itr = itr + 1

Step-6:- if (itr > epoches) go to step-7

else, go to step-2.

Here itr = 3, epoches = 2

$3 > 2 \longrightarrow$ true.

go to step-7.

Step-7:- print variable x.

$\Rightarrow x = 0$

at $x = 0$.

we find minimum value of $f(x)$

$f(0) = 10$