# Assignment - 4:

A)

| | $x_i$ | $y_i$ |
|---|---|---|
| 1 | 7.6 | 157 |
| 2 | 7.1 | 174 |

## Iteration - 1

### Sample - 1

$x_i$ $y_i$

S-1:- $\eta = 0.01$, $m = 1$, $c = -1$ $[7.6, 157]$

S-2:- $\left.\frac{\partial \epsilon}{\partial m}\right|_{m=1} = -(y_i^a - mx_i^a - c) \times (-x_i^a)$

$= +(157 - 1 \times 7.6 - (-1)) \times (7.6)$

$= (158 - 7.6)(7.6)$

$= (150.4)(7.6)$

$= 1143.04$

$\left.\frac{\partial \epsilon}{\partial m}\right|_{c=-1} = -(y_i^a - mx_i^a - c)$

$= -(157 - 1 \times 7.6 - (-1))$

$= -(158 - 7.6)$

$= -150.4$

S-3:- $\Delta m = -\eta \frac{\partial \epsilon}{\partial m} = -(0.01)(1143.04)$

$= -11.430$

$\Delta c = -\eta \frac{\partial \epsilon}{\partial c} = -(0.01)(-150.4)$

$= 1.504$

S-4:- $m = m + \Delta m = 1 + (-11.43) = -10.43$

$c = c + \Delta c = -1 + (1.504) = 0.504$

## Sample - 2.

S-1 :- $[7.1, 174]$, $\eta = 0.01$, $m = 1$, $c = -1$

S-2 :- $\left.\frac{\partial E}{\partial m}\right|_{m=1} = -(y_i^a - mx_i^a - c)(x_i^a)$

$= (174 - 1 \times (7.1) - (-1)) \times 7.1$

$= (175 - 7.1) \times 7.1$

$= 167.9 \times 7.1 = 1192.09$

$\left.\frac{\partial E}{\partial c}\right|_{c=-1} = -(y_i^a - mx_i^a - c)$

$= -(174 - 1(7.1) - (-1))$

$= -167.9$

S-3 :- $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)\ 1192.09$

$= -11.920$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)(-167.9)$

$= 1.679$

S-4 :- $m = m + \Delta m = 1 + (-11.920)$

$= -10.920$

$c = c + \Delta c = -1 + 1.679$

$= 0.679$

Iteration-2

Sample-1 :-

S-1 :- [7.6, 157], $\eta = 0.01$, $m = -10.43$, $C = 0.504$

S-2 :- $\frac{\partial E}{\partial m}\Big|_{m=-10.43} = (157 - (-1043)(7.6) - 0.504)(7.6)$

$= 1791.8064$

$\frac{\partial E}{\partial C}\Big|_{C=0.504} = -(157 - (-10.43)(7.6) - 0.504)$

$= -235.764$

S-3 :- $\Delta m = -\eta \frac{\partial E}{\partial m} = (-0.01 \times 1791.8064)$

$= 17.918064$

$\Delta C = -\eta \frac{\partial E}{\partial C} = (-0.01 \times (-235.764))$

$= 2.35764.$

S-4 :- $m = m + \Delta m = -10.43 + (-17.918064)$

$= -28.3448$

$C = C + \Delta C = 0.504 + 2.35764$

$= 2.86164$

Sample -2 :-

S-1 :- $[7.1, 174]$, $\eta = 0.01$, $m = -10.92$, $c = 0.679$

S-2 :- $\left.\frac{\partial E}{\partial m}\right|_{m=-10.92}$

$= (174 - (-10.92)(7.1) - 0.679)(7.1)$

$= 1781.056.$

$\left.\frac{\partial E}{\partial c}\right|_{c=0.679} = -(174 - (-10.92)(7.1) - (0.679))$

$= -250.853$

S-3 :- $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01) \times (1781.056)$

$= -17.810$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)(-250.853)$

$= 2.508.$

S-4 :- $m = m + \Delta m$

$= -10.92 + (-17.810)$

$= -28.73$

$c = c + \Delta c$

$= 0.679 + 2.508$

$= 3.187.$