BGD - Assignment 5(a).

Iteration - 1.

X	Y
75.1	577.8
79.3	577
88.7	570.9

step 1 :- $n = 0.01$, itr=1, $m = 1$, $c = -1$, epochs = 2.

step 2 :-

$$\frac{\partial E}{\partial m_o}\Big|_{m=1} = -\frac{1}{3}\Big[\big((577.8 - 1 + (75.1) - (-1)) * 75.1\big)$$

$$+ \big((577 - 1 * (79.3) - (-1) * 79.3\big) +$$

$$\big((570.9 - 1 * (88.7) - (-1)) * 88.7\big)\Big]$$

$$= -\frac{1}{3}\big(37,827.87 + 37,424.91 + 42859.84\big)$$

$$= -\frac{1}{3}\, 39370.873.$$

step 3 :-

$$\frac{\partial E}{\partial c}\Big|_{c=-1} = -\frac{1}{3}\Sigma(y - mx_i - c)$$

$$= -\frac{1}{3}\Big[\big(577.8 - 1(75.1) - (-1)\big) + \big(577 - 1 * 79.3$$

$$- (-1)\big) +$$

$$+ \big(570.9 - 1 * (88.7) - (-1)\big)\Big]$$

$$= -\frac{1}{3}\big(503.7 + 503.7 + 483.2\big)$$

$$= -496.86$$

Step 3:-

$$\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(-39470.873)$$

$$= 394.708$$

$$\Delta C = -\eta \frac{\partial E}{\partial c} = -(0.01)(-496.86)$$

$$= 4.968$$

Step 4:-
$$m = m + \Delta m$$
$$= 1 + 393.708$$
$$= 394.708$$

$$C = C + \Delta C$$
$$= -1 + (4.968)$$
$$= 3.968$$

Step 5:- iter = iter + 1
$$= 1 + 1$$
$$= 2.$$

*Iteration - 2.

Step 1:- $\eta = 0.01$ $m = 394.708$, $C = 3.968$
, iters = 2, epochs = 2

step 2:-
$$\frac{\partial E}{\partial m}\Big|_{m=394.708} = \frac{-1}{3}\big[(1750((577.8 - ((394.708) \times 75.1)$$
$$- 3.968) * 75.1)$$
$$+ ((5707 - (394.708) \times (74.3) - 3.968) *$$
$$74.3)$$
$$+ ((570 - (394.708) \times (88.7) - 3.968) *$$
$$88.7)\big]$$

$$= \frac{1}{3}\left[(-29068.7388 \times 75.1) + (-28755.772 \times 74.3)\right.$$
$$\left. + (-34443.667 \times 88.7)\right]$$

$$= +5337851.303$$

$$\frac{\partial E}{\partial C} = \frac{-1}{3}\left[(577.8 - ((394.708) \times 75.1) - 3.968)\right.$$
$$+ (577 - ((394.708) \times 74.3) - 3.968)$$
$$\left. + (570.9 - ((394.708) \times 88.7) - 3.968)\right]$$

$$= \frac{-1}{3}\left[-29068.7388 + (-28753.772)\right.$$
$$\left. + (-34443.667)\right]$$

$$= 30755.392$$

Step 3 :— $\Delta m = -\eta \dfrac{\partial E}{\partial m} = -(0.01) \times (5337851.303)$

$$= -53378.513$$

$$\partial C = -\eta \frac{\partial E}{\partial C} = -(0.01) \times (30755.392)$$
$$= -307.553$$

step 4 :—

$$m = m + \Delta m$$
$$= 394.708 - 53378.513$$
$$= 394.708 - 53378.513$$
$$= -52,983.805$$

$$C = C + \Delta C$$
$$= 3.968 + 307.553$$
$$= -303.585.$$