Assignment

4A

Data

X	Y
7.6	157
7.1	174

$Y_p \rightarrow$ Predicted Y

$Y_a \rightarrow$ Actual Y

→ Iteration = 1, $\eta = 0.1$, $m = 1$, $c = -1$ (Sample 1)

$$Y_p = mx + c = 6.6$$

$$E = \frac{1}{2}(Y_a - mx - c)^2 = \frac{1}{2}(157 - (1)(7.6) - (-1))^2$$

$$E = 11310.08$$

$$\frac{\partial E}{\partial m} = -(Y_a - mx - c)x = -(157 - 6.6) * 7.6$$

$$\frac{\partial E}{\partial m} = -1143.04$$

$$\frac{\partial E}{\partial c} = -(Y_a - mx - c) = -150.4$$

$$\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.1)(-1143.04) = 114.304$$

$$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-150.4) = 15.04$$

$$m = 1 + 114.304 = \underline{115.304}$$

$$c = -1 + 15.04 = \underline{14.04}$$

→ Iteration = 1, $\eta = 0.1$, $m = 115.304$, $c = 14.04$ (Sample 2)

$$Y_p = (115.304) * (7.1) + (14.04)$$

$$Y_p = 832.6984$$

$$E = \frac{1}{2}(174 - 832.6984)^2 = 216941.791$$

$$\frac{\partial E}{\partial m} = -(174 - 832.6984) * (7.1) = 4676.759$$

$$\frac{\partial E}{\partial c} = -(174 - 832.6984) = 658.698$$

$$\Delta m = -(0.1)(4676.759) = -467.676$$

$$\Delta c = -(0.1)(658.698) = -658.698$$

$$m = 115.304 - 467.676 = -352.372$$

$$c = 14.04 - 658.698 = -644.658$$

→ Iteration = 2, $\eta = 0.1$, $m = -352.372$, $c = -644.658$

(Sample 1)

$$Y_p = (-352.372)(7.6) + (-644.658)$$

$$= -3322.6852$$

$$E = \frac{1}{2}(157 + 3322.6852)^2 = 6054104.546$$

$$\frac{\partial E}{\partial m} = -(3479.685)(7.6) = -26445.606$$

$$\frac{\partial E}{\partial c} = -3479.685$$

$$\Delta m = -(0.1)(-26445.606) = 2644.560$$

$$\Delta c = -(0.1)(-3479.685) = 347.969$$

$$m = -352.372 + 2644.560 = \underline{2292.188}$$

$$c = -644.658 + 347.969 = \underline{-296.689}$$

→ Iteration = 2, $\eta = 0.1$, $m = 2292.188$, $c = -296.689$ (Sample 2)

$$Y_p = (2292.188)(7.1) - 296.689 = 15977.846$$

$$E = \frac{1}{2}(174 - 15977.846)^2 = 124880771.035$$

$$\frac{\partial E}{\partial m} = -(0.1)(174 - 15977.846)(7.1) = 112207.305$$

$$\frac{\partial E}{\partial c} = -(174 - 15977.846) = 15803.846$$

$$\Delta m = -(0.1)(112207.305) = -11220.731$$

$$\Delta c = -(0.1)(15803.846) = -1580.385$$

$$m = 2292.188 - 11220.731 = \underline{-8928.543}$$

$$c = -296.689 - 1580.385 = \underline{-1877.074}$$