

6a)

Price	Sqft living
221900	1180
538000	2570
180000	770
604000	1960

Sample 1 / Batch 1

Price(y)	Sqft(x)
221900	1180
538000	2570

Sample 2 / Batch 2

Price(y)	Sqft(x)
180000	770
604000	1960

- 1) $\eta = 0.1$, epochs = 1, $m = 1$ and $c = -1$, $n = 2$
- 2) set iteration = 1
- 3) set batch $i = 1$

$$4) \frac{\partial E}{\partial m} = -(0.5) [(221900 - 1^* 1180 + 1)^2 + 1180^2 + (538000 - 1^* 2570 + 1)^2 + 2570^2]$$

$$= -(0.5) (1636508450) = -818254225$$

$$\frac{\partial E}{\partial c} = -(0.5) [(221900 - 1^* 1180 + 1) + (538000 - 1^* 2570 + 1)]$$

$$= -378076$$

$$5) \text{ Step length } \Delta m = -(0.1) (-818\ 254\ 225) \\ = 818\ 254\ 225$$

$$\Delta c = -(0.1) (-378076) = 378076$$

$$6) \text{ Update } m = 1 + 818\ 254\ 222.5 \text{ and } c = -1 + 37807.6 \\ m = 818\ 254\ 223.5 \text{ and } c = 37806.6$$

$$7) \text{ Set batch } q = 1 + 1 = 2 \text{ and } i = 2.$$

$$\text{Repeat (4): } \frac{\partial \mathcal{E}}{\partial m} = -(0.5) [(18000 - 818\ 254\ 223.5)^2 \\ + (770 - 37806.6)^2 + (604000 - 818\ 254\ 223.5)^2 + (1960 - 37806.6)^2] \\ = 1.55\ 266047e^{14}$$

$$\frac{\partial \mathcal{E}}{\partial c} = 8.33399489e^{10}$$

$$\text{Repeat (5): step length } \Delta m = -(0.1) (1.55\ 266047e^{14}) \\ = -1.55\ 266047e^{13} \\ \Delta c = -(0.1) (8.33399489e^{10}) \\ = -8.33399489e^9$$

$$\text{Repeat (6): } m = 818\ 254\ 223.5 - 1.55\ 266047e^{13} \\ m = -1.55\ 26229e^{13} \\ c = -8.33395708e^9$$