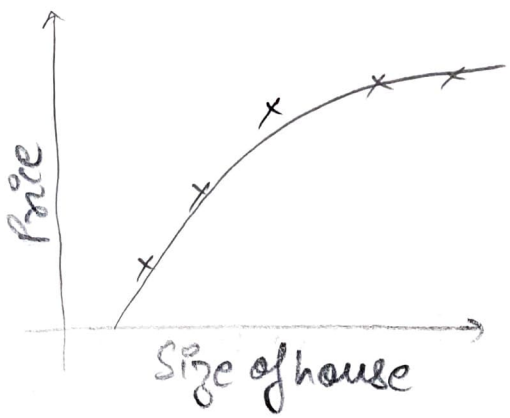
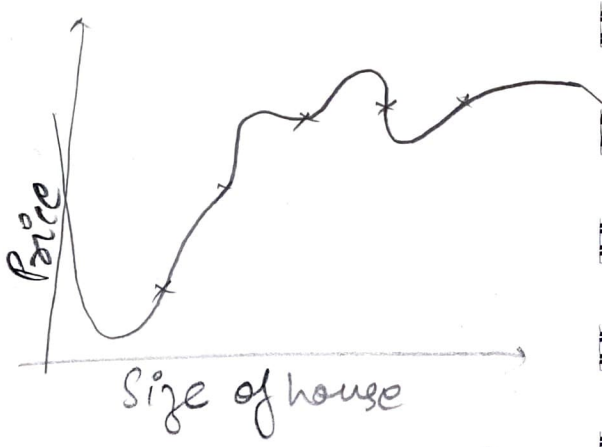
Intuition



$\theta_0 + \theta_1 x + \theta_2 x^2$



$\theta_0 + \theta_1 x_0 + \theta_2 x^2 + \theta_3 x^3 + \theta_4 x^4$.

Suppose we penalize and make θ_3 & θ_4 really small

$$\min_{\theta} \frac{1}{2m} \sum_{i=1}^{m} \left(h_\theta(x^{(i)}) - y^{(i)}\right)^2 + 1000\theta_3^2 + 1000\theta_4^2$$

↳ $\theta_3 \approx 0$ & $\theta_4 \approx 0 \Rightarrow \theta_0 + \theta_1 x + \theta_2 x^2 + 0 + 0$

Regularization

Small values for parameters $\theta_1, \theta_2 \cdots \theta_n$

↳ Simpler hypothesis

↳ Less prone to overfitting

eg) Housing:

↳ Features $\Rightarrow x_1, x_2, \cdots x_{100}$

↳ Parameters $\Rightarrow \theta_0, \theta_1, \theta_2, \cdots, \theta_{100}$

$$J(\theta) = \frac{1}{2m}\left[\sum_{i=1}^{m} \left(h_\theta(x^{(i)}) - y^{(i)}\right)^2 + \lambda \sum_{j=1}^{n} \theta_j^2\right]$$