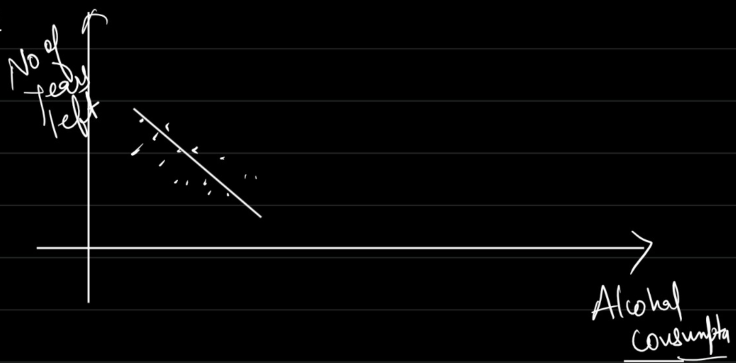
Multiple Linear Regression

Example-1 → Predict Price of house based on no. of rooms / Area of hous.

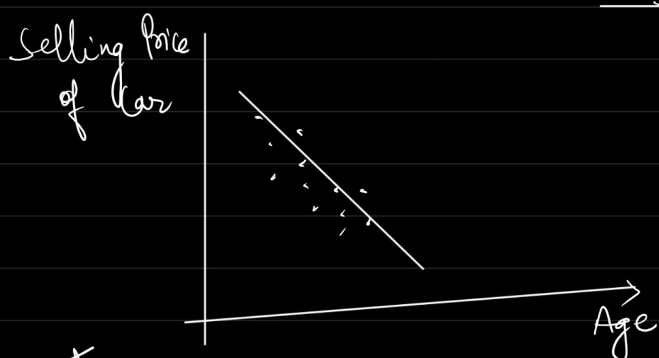
Ex-2



X # of rooms	y (Price of house)

$y = f(x)$

Ex3.



$y_{pred} = \theta_0 + \theta_1 X$

$c + mx$

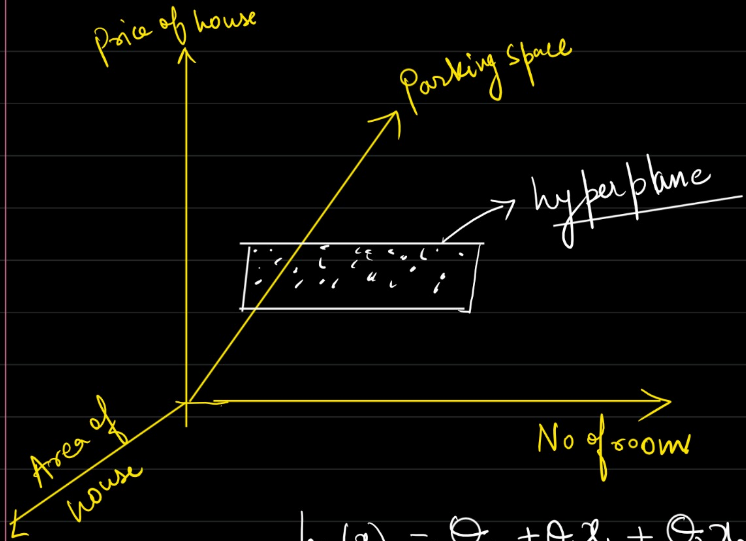
Till now we have only one feature (IV-X)

* Simple linear Regression
  - ↳ only one feature.

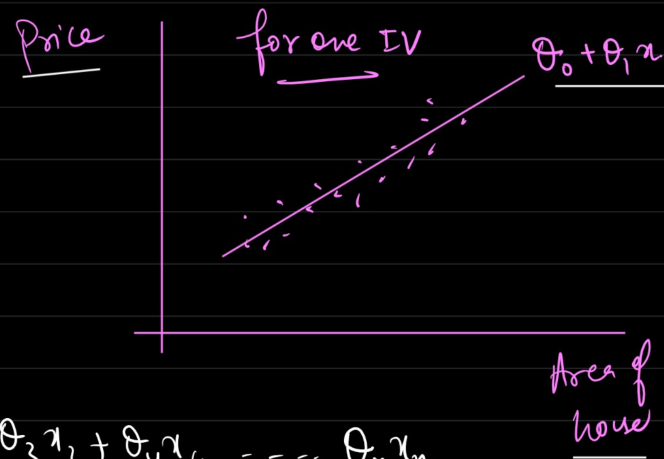
Ex-4

* Only One feature cannot be enough to predict the target variable.

# of rooms (x_1)	Parking space (x_2)	# Area of house (x_3)	y (price of house)
2	100	1100	80



SLR



$$h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3 + \theta_4 x_4 \; \cdots \; \theta_n x_n$$

$$(\theta_0, \theta_1, \theta_2 \cdots \theta_n)$$

$$y_{pred} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \cdots \beta_n x_n$$

↳ optimal coeff.

$$= c + m_1 x_1 + m_2 x + m_3 x_3 \cdots m_n x_n$$

Cost Fn of MLR

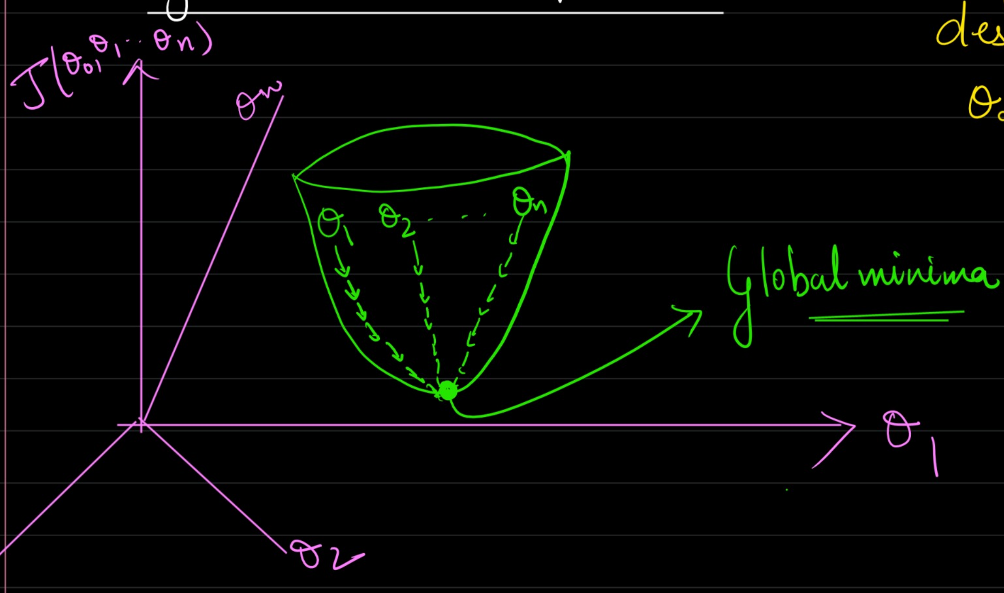
$$J(\theta_0, \theta_1, \theta_2 \cdots \theta_n) = \frac{1}{n} \sum_{i=1}^{n} \left(y_i - y_{pred} \right)^2$$

$$J(\theta_0 \cdots \theta_n) = \frac{1}{n} \left(y_i - (\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3 + \cdots \theta_n x_n) \right)^2$$

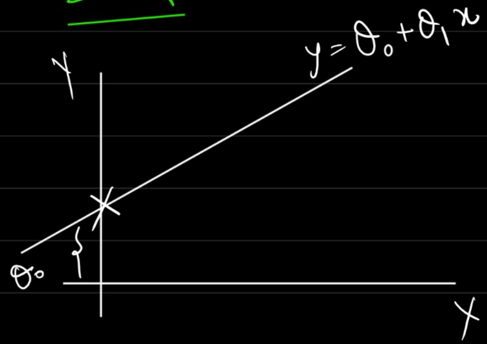
⇓

minimise the equation using gradient descent to get optimal $\theta_0, \theta_1, \theta_2 \cdots \theta_n$ (coeff)

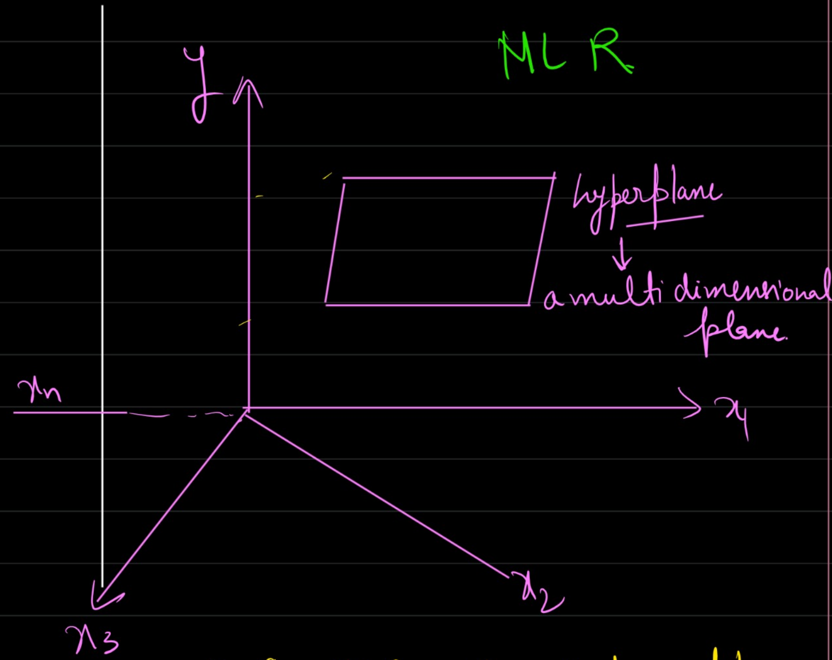
Gradient descent for MLR



SLR



MLR



→ In MLR, the intercept is the point where this hyperplane intersects the vertical axis (y - dependent/target variable)

$$\boxed{h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \dots \theta_n x_n}$$