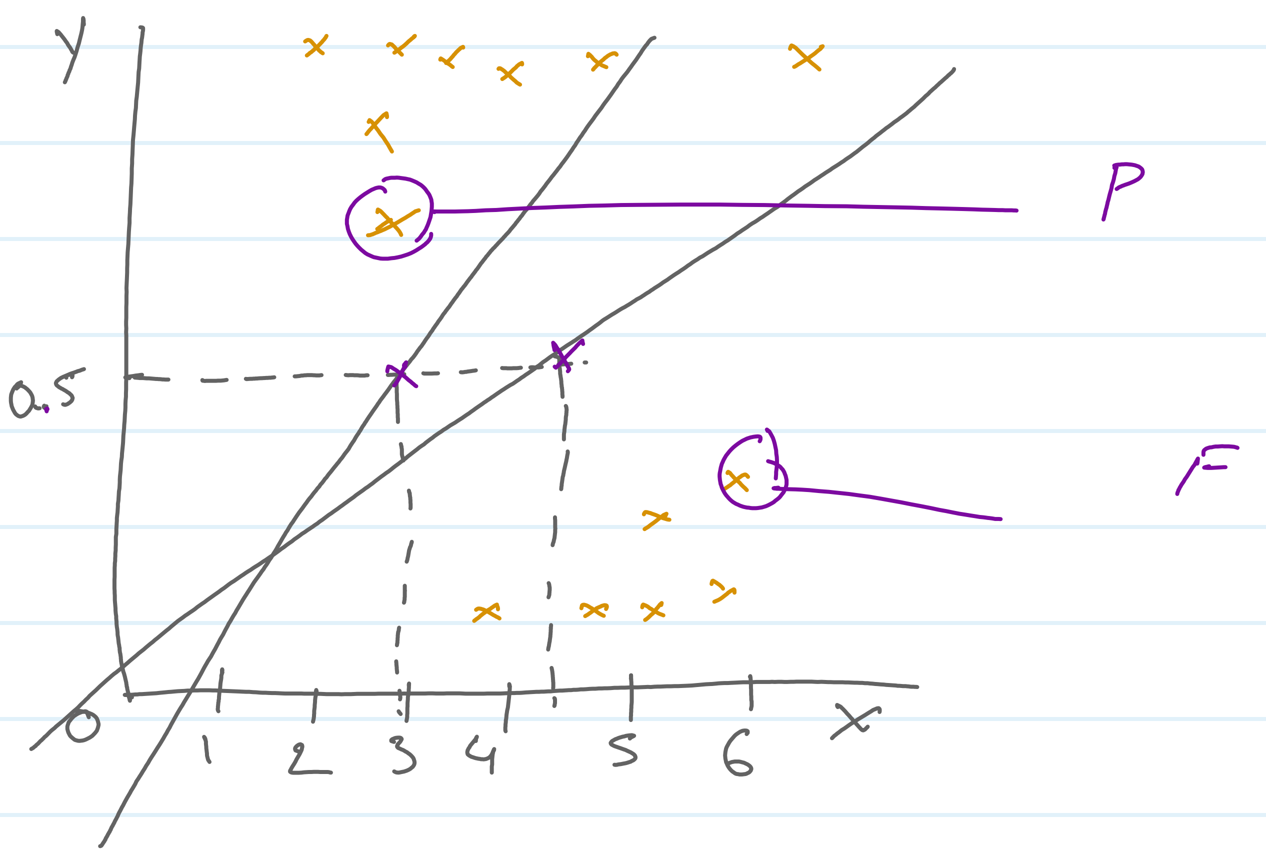
Logistic Regression



Line eqn $h_\theta(x) = \theta_0 + \theta_1 x_1$

but here we apply sigmoid function on line eqn.

Step-I $z = h_\theta(x) = \theta_0 + \theta_1 x$

step-II

$$\text{Sigmoid function} = \frac{1}{1+e^{-z}}$$

$$z = \theta_0 + \theta_1 x$$

We get always 0 and 1 value after applying this formula.

cost function -

$$J(\theta_0, \theta_1) = \frac{1}{m}\sum_{i=1}^{m}\left[h_\theta(x)^i - y^{(i)}\right]^2$$

This is convex function of Linear Regress.

↑

linear Reg - one global minima

logistic - local minima

logistic cost funct -

$$J(\theta_0, \theta_1) = \frac{1}{m}\sum_{i=1}^{m}\left[h_\theta(x)^i - (y)^i\right]^2$$

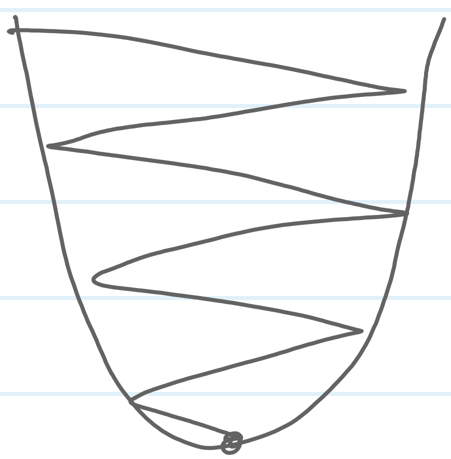
$$h_\theta(x) = \sigma(\theta_0 + \theta_1 x)$$

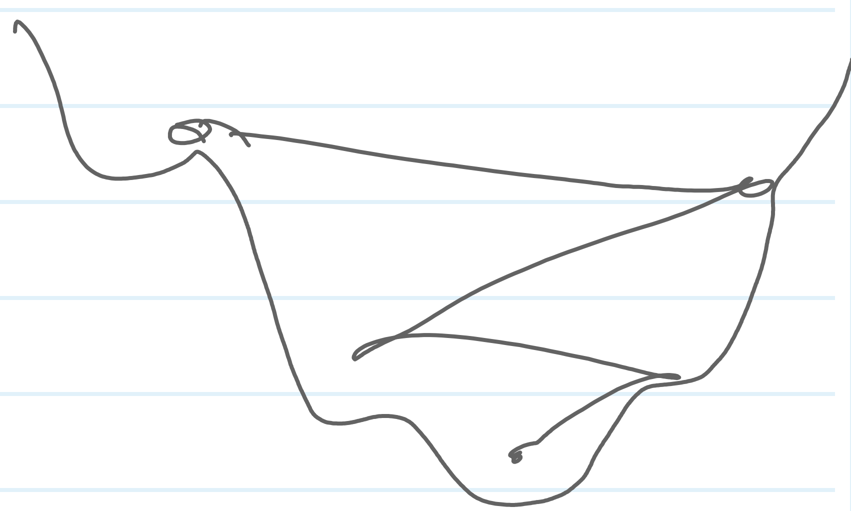
$$\sigma(z) = \frac{1}{1+e}$$

$$\sigma = \frac{1}{1+e^{-z}}$$

$$\frac{1}{1+e^{-z}} = \frac{1}{1+e^{-(\theta_0+\theta_1 x)}}$$

This is non-convax function.





Repeat Conversion theorem

[j = 0 and 1 }

$$\theta_j = \theta_j - \alpha \frac{\partial}{\partial \theta_j} j(\theta_0, \theta_1)$$

α is learning rate

Note- ① Logistic Regression can use for Binary or multiclass classification.

② Only solve class. problem

③ sigmoid function is key of logistic regre

④ usually it gives best model for Binary class classification.