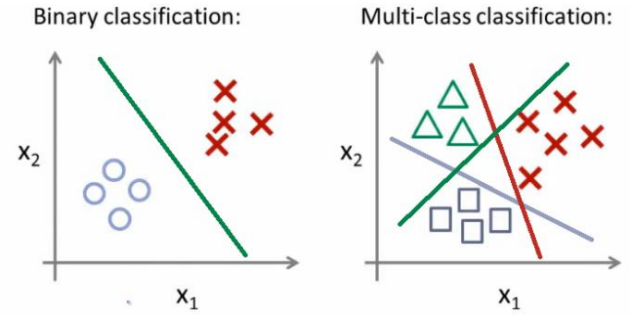
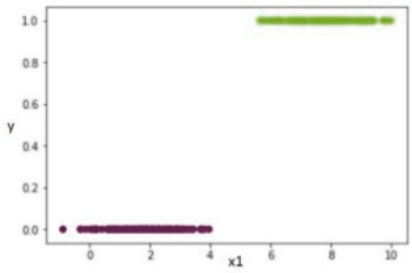
LOGISTIC REGRESSION: Binary classification model



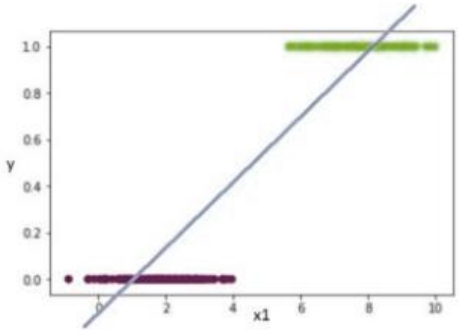
Why the name includes regression and not classification???

It uses the regression inside to be the classification algorithm.

Given X or (Set of x values) we need to predict whether Y is 0 or 1 (Yes/No).

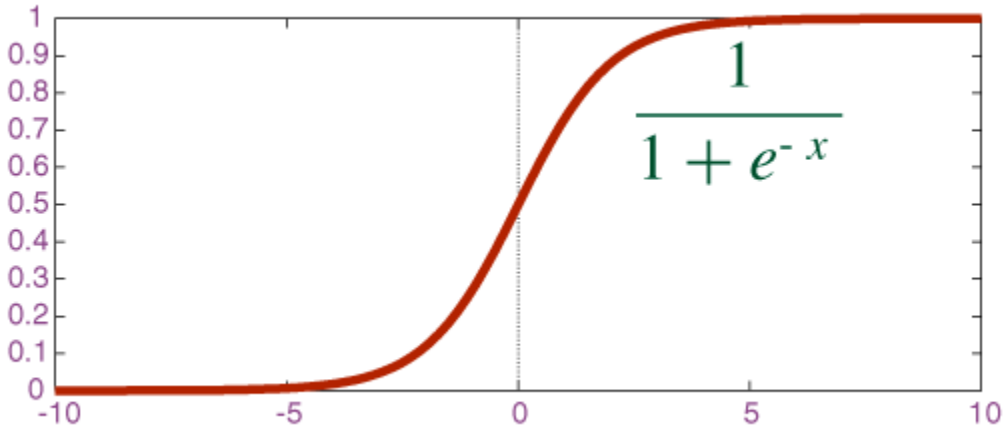


With **<u>Linear Regression</u> (y = mx + c)**



We only accept the values between 0 and 1. How do we manage that?

Solution: Sigmoid function



We first apply the linear equation and apply Sigmoid function for the result so we get the value which is between 0 and 1.

Logistic regression cost function

$$J(\theta) = \frac{1}{m}\sum_{i=1}^{m} \text{Cost}(h_\theta(x^{(i)}), y^{(i)})$$
$$= -\frac{1}{m}[\sum_{i=1}^{m} y^{(i)} \log h_\theta(x^{(i)}) + (1 - y^{(i)}) \log (1 - h_\theta(x^{(i)}))]$$

$$P(y=1 \mid x;\theta) = h_\theta(x) = \frac{1}{1+e^{-\theta^T x}}$$

Taken from Prof. Andrew Ng.'s Coursera ML course

$$J(\theta) = \frac{1}{m}\sum_{i=1}^{m} \text{Cost}(h_\theta(x^{(i)}), y^{(i)})$$

$$\text{Cost}(h_\theta(x), y) = \begin{cases} -\log(h_\theta(x)) & \text{if } y = 1 \\ -\log(1 - h_\theta(x)) & \text{if } y = 0 \end{cases}$$

Note: $y = 0$ or 1 always