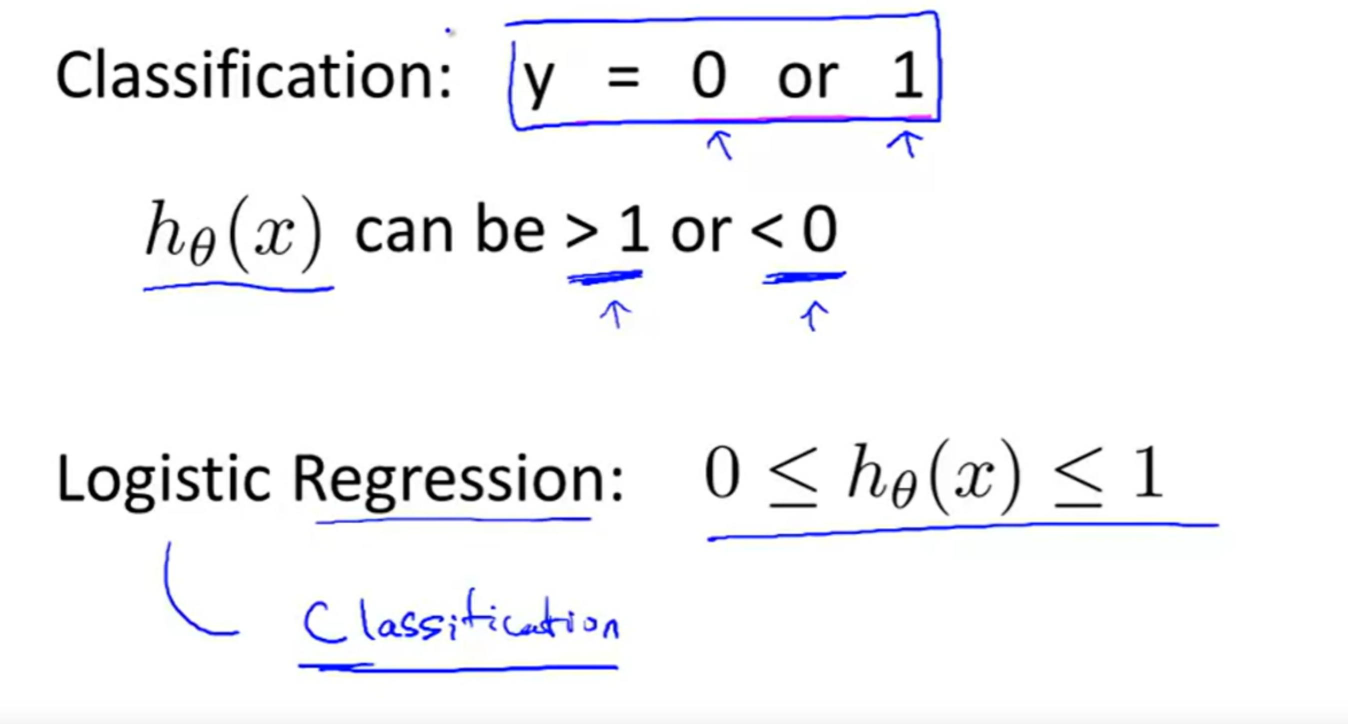
Week 3.1 Classification and Representation

Classification



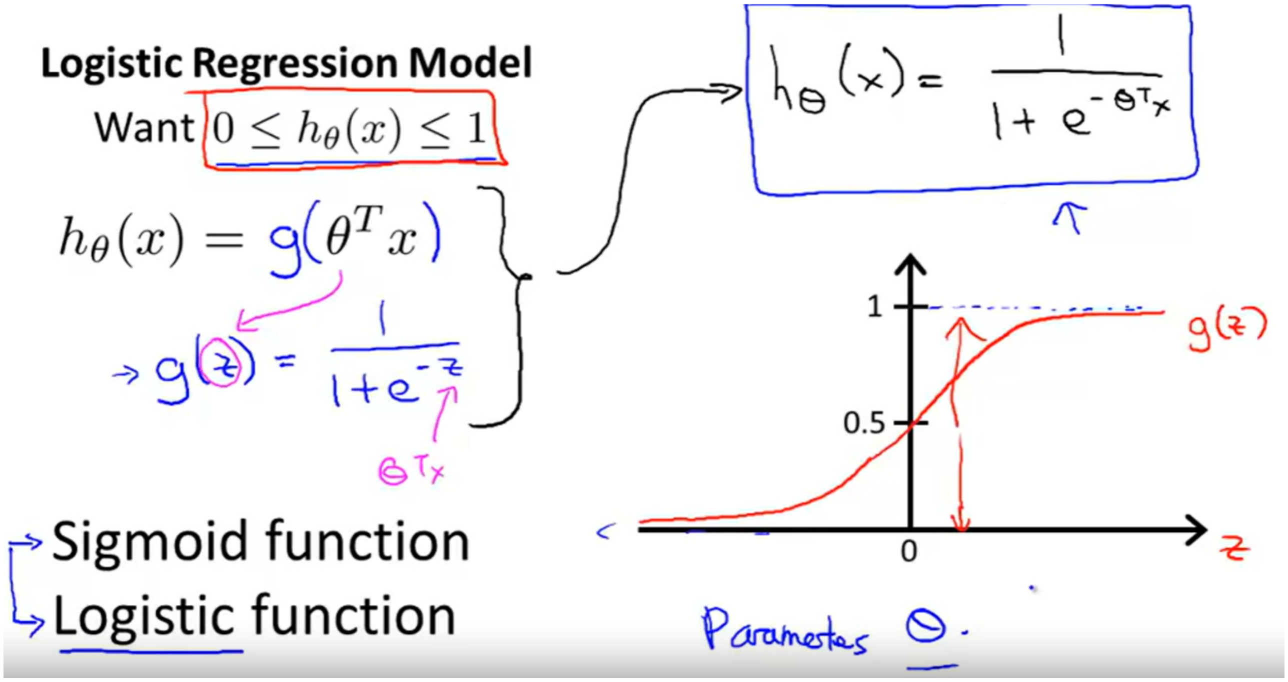
- Linear Regression is not a good idea

Hypothesis Representation

Sigmoid Function

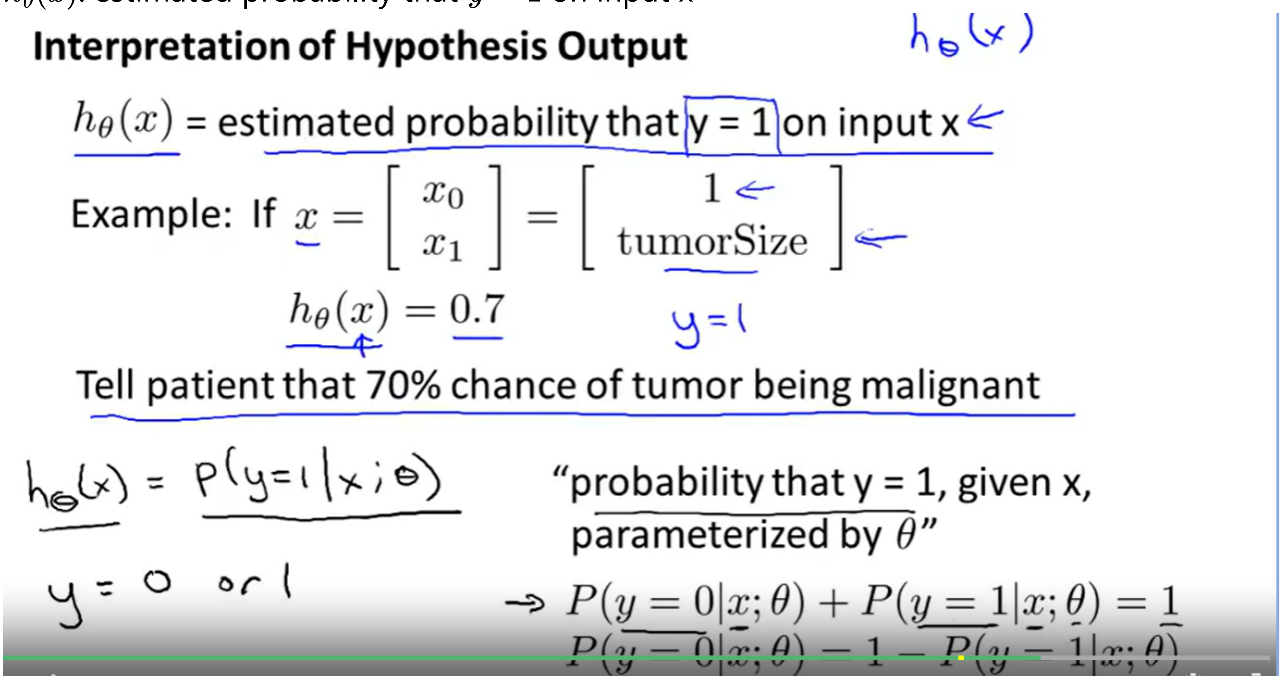
- we want $1 \leq h_\theta(x) \leq 1$
- $g(\theta^T x)$
- where $g(z) = \frac{1}{1+e^{-z}}$ (**Sigmoid function/Logistic function**)

- Our goal: fit parameters θ of our data



Interpretation

- $h_\theta(x)$: estimated probability that $y = 1$ on input x

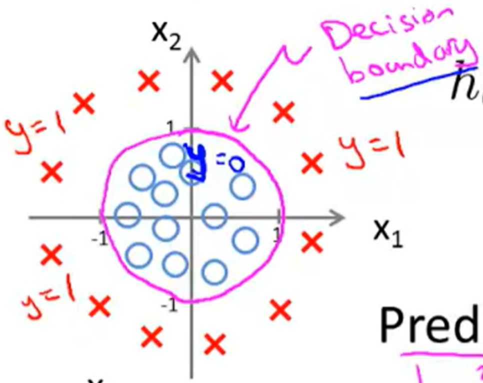


Decision Boundary

- predict $y = 1$ when $z > 0$
- predict $y = 0$ when $z < 0$
- Decision Boundary: the separate line

Nonlinear Decision Boundary

Non-linear decision boundaries



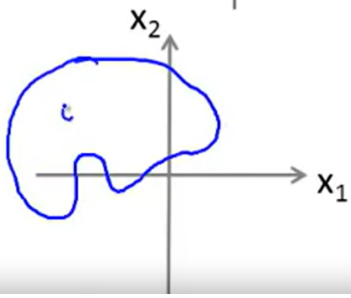
$$h_\theta(x) = g(\overset{=-1}{\theta_0} + \overset{=0}{\theta_1} x_1 + \overset{=0}{\theta_2} x_2 + \underset{=1}{\theta_3} x_1^2 + \underset{=1}{\theta_4} x_2^2)$$

$$\theta = \begin{bmatrix}-1\\0\\0\\1\\1\end{bmatrix}$$

Predict "$y = 1$" if $-1 + x_1^2 + x_2^2 \geq 0$

$\boxed{x_1^2 + x_2^2 = 1}$

$x_1^2 + x_2^2 \geq 1$



$$h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 \underline{x_1^2} + \theta_4 \underline{x_1^2 x_2} + \theta_5 \underline{x_1^2 x_2^2} + \theta_6 \underline{x_1^3 x_2} + \dots)$$