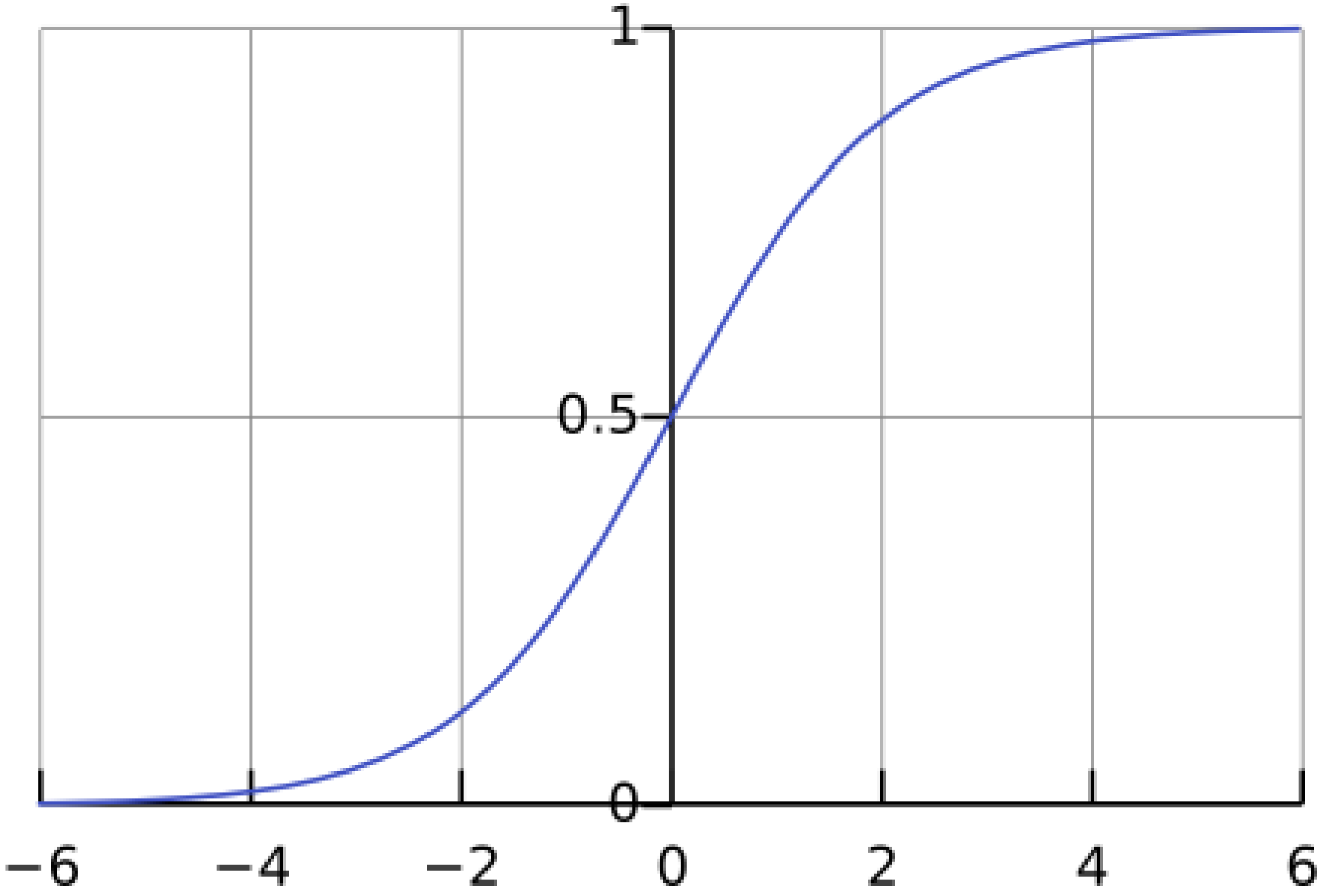
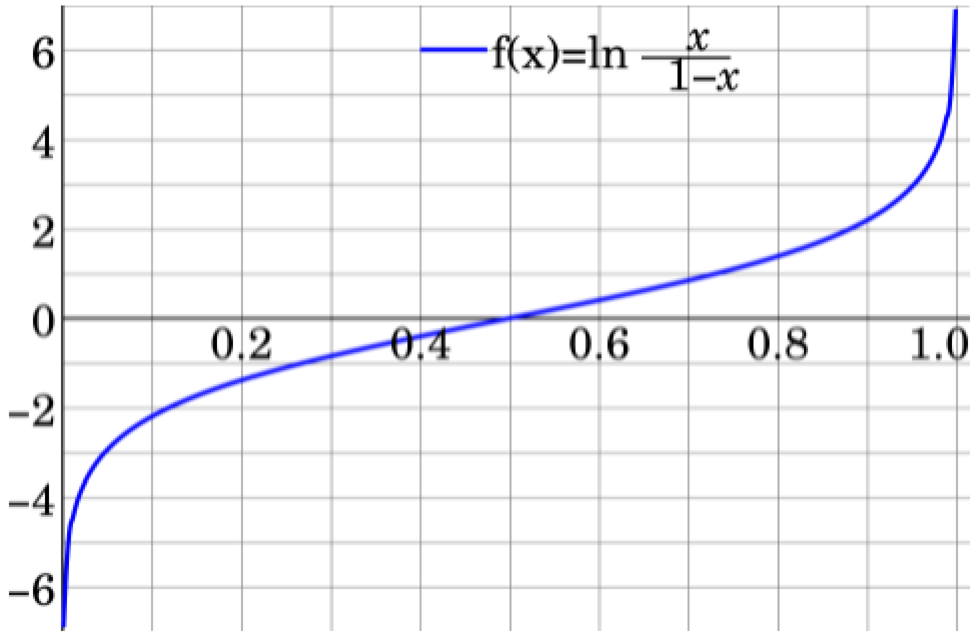
Logistic Function

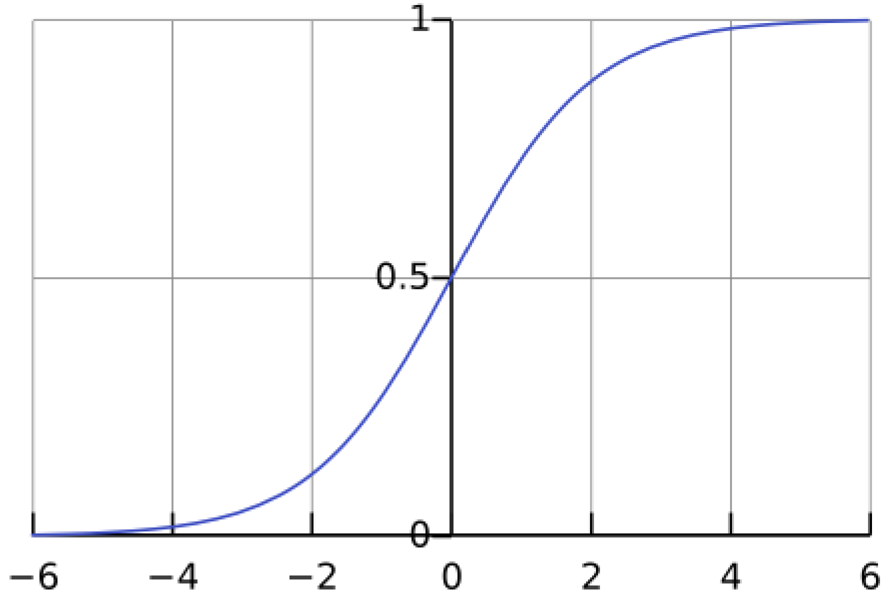


$$\text{Logistic Function} : \log\left(\frac{1}{1+e^{-x}}\right)$$

$$\text{Odds} = \frac{x}{1-x}$$

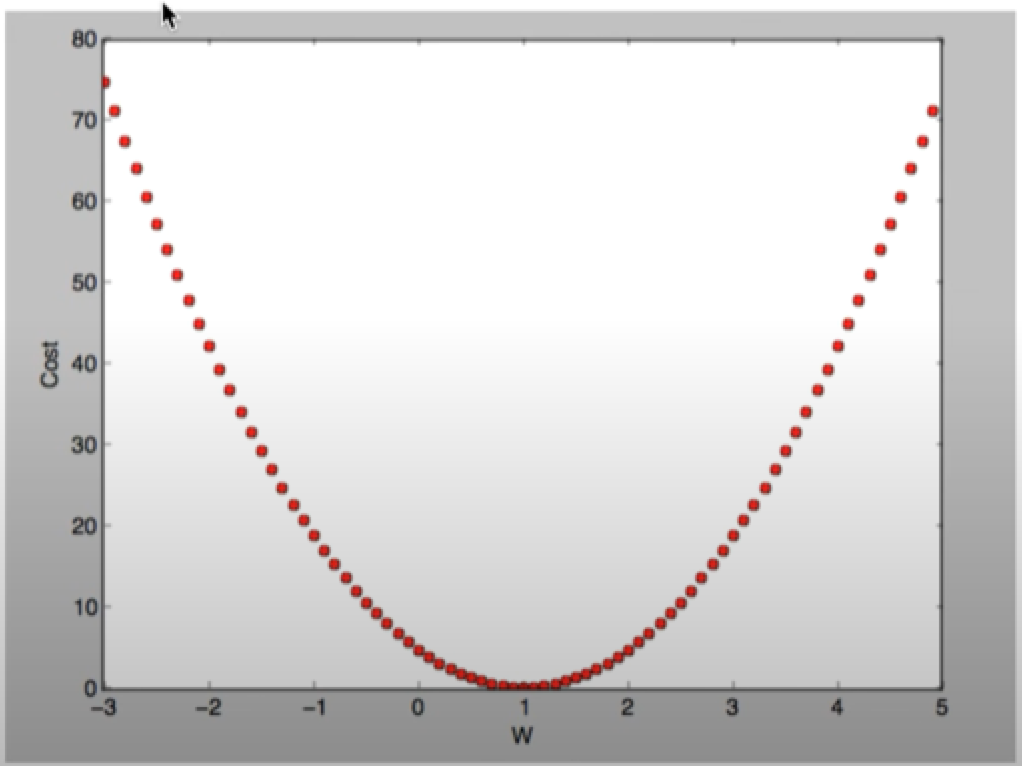
$$\text{Logit} = \log\left(\frac{x}{1-x}\right)$$





Cost

$$cost(W,b) = \frac{1}{m}\sum_{i=1}^{m}(H(x^{(i)}) - y^{(i)})^2 \quad \text{when} \quad H(x) = Wx + b$$



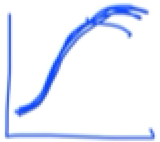
Cost function

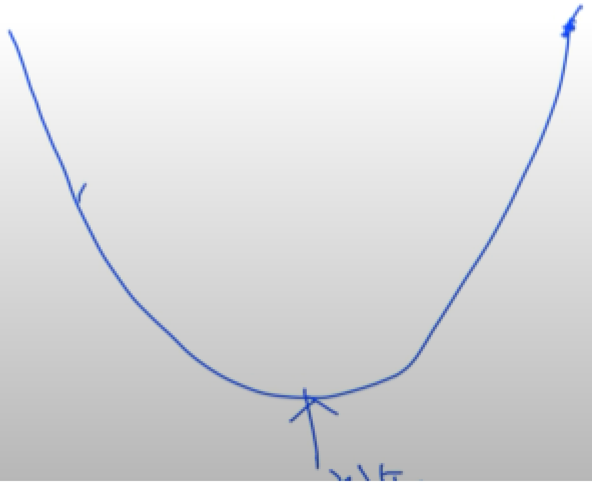
$$cost(W,b) = \frac{1}{m}\sum_{i=1}^{m}(H(x^{(i)}) - y^{(i)})^2$$

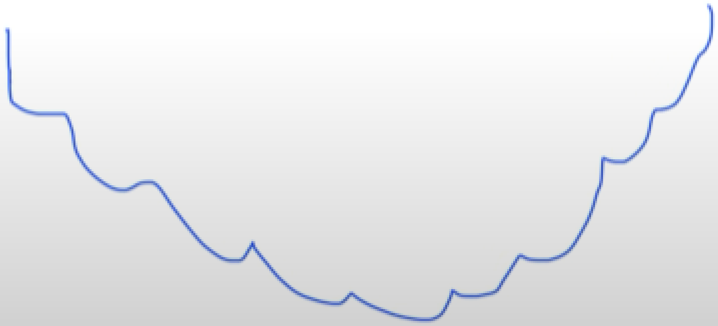
0< ~ <1

$$H(x) = Wx + b$$

$$H(X) = \frac{1}{1+e^{-W^T X}}$$







$$cost(W) = -\frac{1}{m}\sum ylog(H(x)) + (1-y)log(1-H(x))$$

$$\mathrm{Bern}(x;\mu) = \begin{cases} \mu & \text{if } x = 1, \\ 1-\mu & \text{if } x = 0 \end{cases} \quad (8.2.2)$$

$$\mathrm{Bern}(x;\mu) = \mu^x (1-\mu)^{(1-x)}$$

$$P(y|x) = \mu(x)^y (1-\mu(x))^{1-y}$$

$$-\log P(Y|X;\theta) = -\log \sum_{i=1}^{m} \{Y_i \log \mu(X_i) + (1-Y_i)\log(1-\mu(X_i))\}$$
$$\because P(Y_i|X_i;\theta) = \mu(X_i)^{Y_i}(1-\mu(X_i))^{1-Y_i}$$

$$cost(W) = -\frac{1}{m}\sum y\log(H(x)) + (1-y)\log(1-H(x))$$

understanding cost function

$$C(H(x),y) = \begin{cases} -\log(H(x)) & : y=1 \\ -\log(1-H(x)) & : y=0 \end{cases}$$

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

log

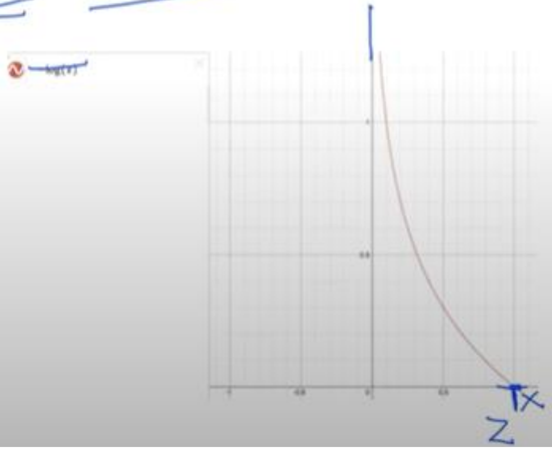
Cost $\boxed{y=1}$

$H(x)=1 \rightarrow cost(1)=0$

$H(x)=0 \rightarrow cost=\infty \uparrow$

cost

$g(z) = -\log(z)$

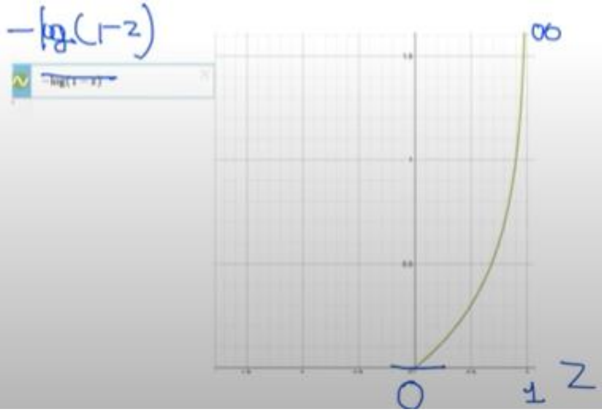


$y=0$

$H(x)=0$, $cost=0$

$H(x)=1$, $cost=\infty$

$-\log(1-z)$



$$cost = -\sum_{j=1}^{k} y_j \, log(p_j)$$