# Logistic Regression

# logit link function and log odds

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1$$

$$p = \frac{e^{\beta_0+\beta_1 x_1}}{1+e^{\beta_0+\beta_1 x_1}} = \text{[a little algebra]}$$

$$= \frac{1}{1+e^{-(\beta_0+\beta_1 x_1)}}$$

odds

$$y = X\beta$$

$$y = g^{-1}(\mathbf{X}\beta)$$

$$\underbrace{\text{logit link function}}$$

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# Redefining The Response

original $Y$

$Y$ as probability

odds of $Y$

$Y' \in (-\infty, \infty)$