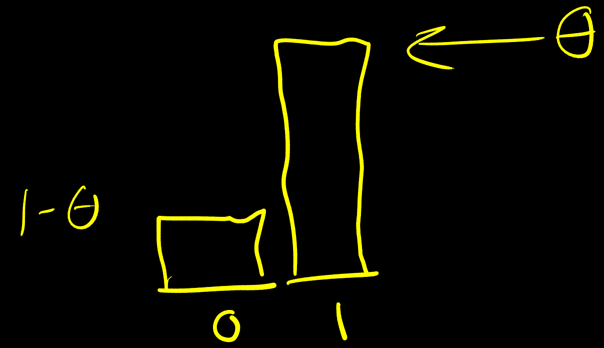
$y_1 \quad y_2 \quad y_3 \quad \cdots \quad y_n$

$Y_1 \quad Y_2 \quad Y_2 \quad \cdots \quad Y_n$



i for each i $\qquad Y_i \sim \text{bernoulli}(\theta_i)$

$$\cancel{\theta_i = \beta_0 + \beta_1 x_i}$$

$$\log\left[\frac{\theta_i}{1-\theta_i}\right] = \beta_0 + \beta_1 x_i$$

link $\quad$ log odds / logits $\quad$ is linear of x a: person 35, married 10

θ_a:

e^{β} = odds ratio.

b: person 35, married 11

θ_b

odds ratio

$$\text{odds} = \frac{\text{prob}}{1-\text{prob}}$$

$$\frac{\theta_a / 1-\theta_a}{\theta_b / 1-\theta_b} \quad \frac{\text{odds}_A}{\text{odds}_B}$$

Normal linear

$$\begin{cases} y_i \sim N(\mu_i, \sigma^2) \\ \mu_i = \beta_0 + \sum_{k=1}^{k} \beta_k x_{ki} \end{cases}$$

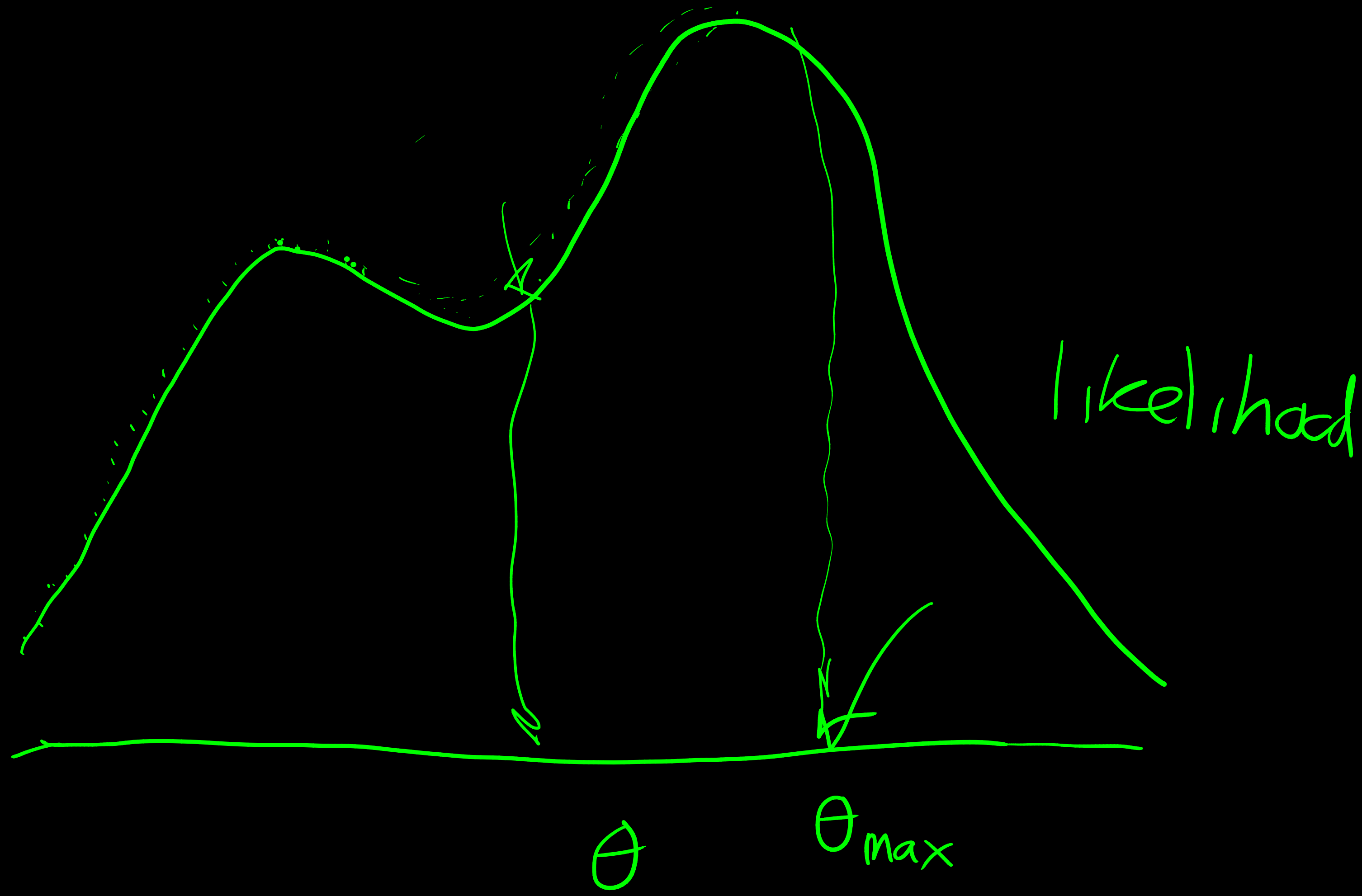
binary logistic

$$y_i \sim \text{bernoulli}(\theta_i)$$

$$\log\left[\frac{\theta_i}{1-\theta_i}\right] = \beta_0 + \sum_{k=1}^{k} \beta_k x_{ki}$$

Normal non linear

$$\begin{cases} y_i \sim N(\mu_i, \sigma^2) \\ \mu_i = f(x_{1i} \ldots x_{ki}) \end{cases}$$


likelihood
θ
θ_{max}

$$y = x^1 + x^9 + x^2$$

$$y = x^0$$

$$y = x^1$$ linear

$$y = x^2$$ quadratic

$$y = x^3$$ cubic

$$y = x^4$$

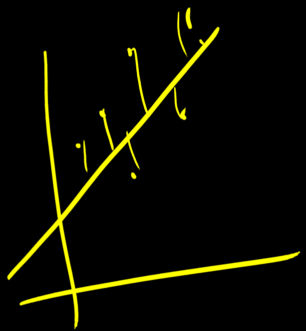
$$y = x^5$$

5th order polynomial regression

$$y_i \sim N(\mu_i, \sigma^2)$$

$$\mu_i = \beta_0 + \beta_1 \underbrace{x^1}_{x} + \beta_2 \underbrace{x^2}_{x_2} + \beta_3 \underbrace{x^3}_{x_3} + \beta_4 \underbrace{x^4}_{x_4} + \beta_5 \underbrace{x^5}_{x_5}$$

$$y_i \sim N(\mu_i, \sigma^2)$$



$$\mu_i = \underline{\beta_0} + \underline{\beta_1} x_i$$

$$\mu_i = \underline{\beta_0} + \underline{\beta_1} x_i + \underline{\beta_2} x_i^2 + \underline{\beta_3} x_i^3$$