

9 Inference

(1)

$p=7$

$$p(D|\theta) = \prod_i p(y_i | x_i; \theta)$$

$$= \underbrace{\left(\frac{1}{\sqrt{2\pi}} \right)^n}_{=: \text{const } Q} \cdot \exp \left[- \frac{(y_1 - \theta_{x_1})^2}{2} - \dots - \frac{(y_n - \theta_{x_n})^2}{2} \right]$$

$$\rightarrow \log p(D|\theta) = \log Q + \left[- \frac{(y_1 - \theta_{x_1})^2}{2} - \dots - \frac{(y_n - \theta_{x_n})^2}{2} \right]$$

$$\ell(\theta) = - \left[(y_1 - \theta_{x_1})^2 + \dots + (y_n - \theta_{x_n})^2 \right]$$

random name;
not conditional
number!

$$\operatorname{argmax} \ell(\theta) = \operatorname{argmin} -\ell(\theta)$$

$$= \operatorname{argmin} [(y_1 - \theta_{x_1})^2 + \dots + (y_n - \theta_{x_n})^2]$$

Least Squares!