

THH 2
21(D)

ex. $(Y_i | \mu, \sigma [SM: N] \mathcal{P})$
 $\sim N(\mu, \sigma^2) (i=1, \dots, n)$

STAT 206
3 Mar 21

(D) extra
OH

$\hat{\mu}_{MLE} = \bar{Y}$ | fact: | $s^2 = \frac{1}{n-1} \sum_{i=1}^n (Y_i - \bar{Y})^2$ ①

$\hat{\sigma}_{MLE}^2 = \frac{1}{n} \sum_{i=1}^n (Y_i - \bar{Y})^2 \rightarrow E_{\mathcal{P}_Y}(s^2) = \sigma^2$

i.e., s^2 is unbiased for σ^2

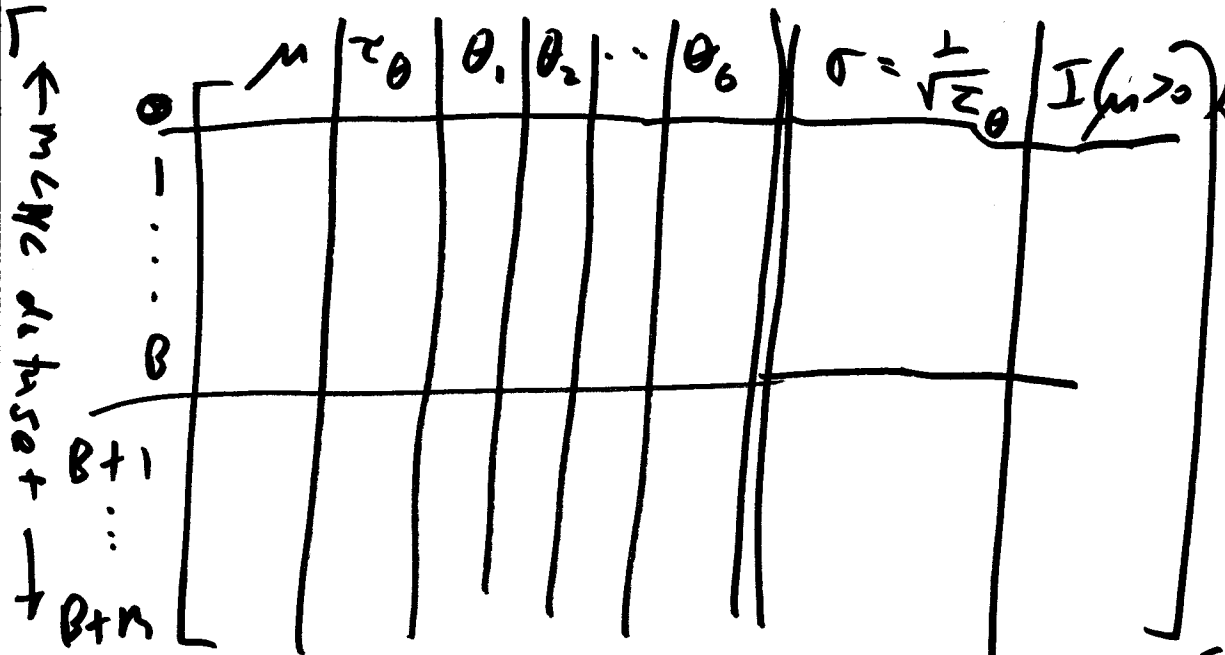
$\sigma^2 = E_{\mathcal{P}_Y}(s^2) = E\left[\frac{1}{n-1} \cdot \sum_{i=1}^n (Y_i - \bar{Y})^2\right]$

So $(n-1) \sigma^2 = E\left[\sum_{i=1}^n (Y_i - \bar{Y})^2\right]$

$E(\hat{\sigma}_{MLE}^2) = E\left[\frac{1}{n} \sum_{i=1}^n (Y_i - \bar{Y})^2\right]$

So $n E(\hat{\sigma}_{MLE}^2) = E\left[\sum_{i=1}^n (Y_i - \bar{Y})^2\right] = (n-1) \sigma^2 \stackrel{O}{=} \left(\frac{1}{n}\right)$

So $E(\hat{\sigma}_{MLE}^2) = \frac{n-1}{n} \sigma^2 = \sigma^2 - \frac{1}{n} \sigma^2$ bias



②

$$P(A|B) = E[I(A|B)]$$

RJAGS:

$$\text{step}(\mu) = \begin{cases} 1 & \text{if } \mu > 0 \\ 0 & \text{else} \end{cases}$$

$$P(\mu > 0 \mid \mathcal{Z}, [SM][PM]B)$$

↑
effect of aspirin on mortality in the ~~pop~~

$$\text{pop.} \left[\left(\begin{matrix} C \\ \text{mortality} \end{matrix} \right) - \left(\begin{matrix} T \\ \text{mortality} \end{matrix} \right) \right]$$