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(f0)

Quiz 10

STAT 131
 2 Jun 20
 JD office
 1.5-hour
 session

P =

From

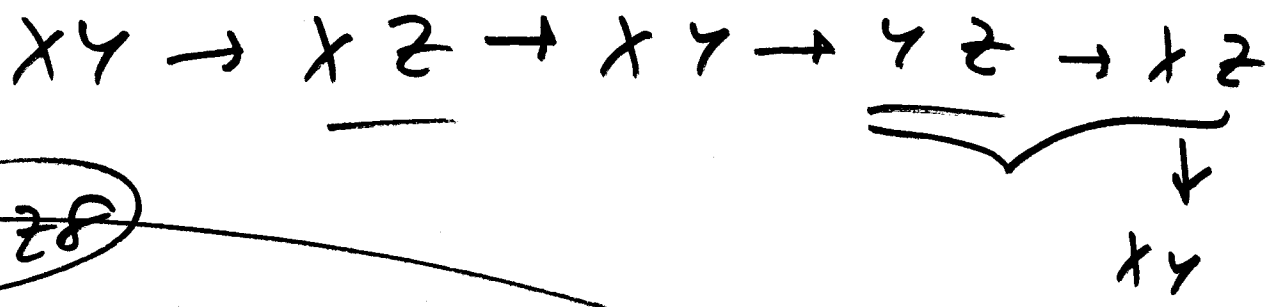
$$\begin{matrix}
 & \begin{matrix} \underline{XY} & \underline{XZ} & YZ \end{matrix} \\
 \begin{matrix} \underline{XY} \\ \underline{XZ} \\ \underline{YZ} \end{matrix} & \left[\begin{array}{ccc}
 0 & p_{XY} & 1-p_{XY} \\
 p_{XZ} & 0 & 1-p_{XZ} \\
 p_{YZ} & 1-p_{YZ} & 0
 \end{array} \right]
 \end{matrix}$$

①

$$p_{XY} = P(\Sigma \text{ beats } \Sigma)$$

$$p_{XZ} = P(\Sigma \text{ beats } \frac{Z}{4})$$

$$p_{YZ} = P(\Sigma \text{ beats } \frac{Y}{4})$$



Quiz 8

$$U_2(x) = 1 + \log(x)$$

\uparrow \uparrow \uparrow
 HT3 # 1 (a) $V(\bar{e}_n) = ?$ $e_i \sim \text{IID}$ $E(e_i) = 0$ $V(e_i) = \sigma^2$ (2)

$$V(\bar{e}_n) = V\left(\frac{1}{n} \sum_{i=1}^n e_i\right)$$

$$= \left(\frac{1}{n}\right)^2 V\left(\sum_{i=1}^n e_i\right) = \frac{1}{n^2} \sum_{i=1}^n V(e_i) = \frac{1}{n^2} \sum_{i=1}^n \sigma^2 = \frac{\sigma^2}{n}$$

PDF of e_i
 $E(e_i) = 0$
 $V(e_i) = E(e_i - E(e_i))^2$

$\text{IID} = \frac{1}{n^2} \sum_{i=1}^n V(e_i) = \frac{1}{n^2} \sum_{i=1}^n \sigma^2 = \frac{\sigma^2}{n}$

$$Y_i = \theta + b + e_i$$

\uparrow constants \uparrow IID
 \uparrow r.v.

$$E(Y_i) = E(\theta + b + e_i)$$

$$= \theta + b + E(e_i)$$

Suppose temporarily

$$\text{that } E(e_i) = 1$$

$$E(Y_i) = \theta + (b + 1) = \theta + b^*$$

$b^* = b + 1$

\uparrow \uparrow
 that's \uparrow bias
 \uparrow \uparrow
 that's \uparrow bias

$$\text{Q. no. } \neq 8 \quad U_2(x) = 1 + \log(x) \quad \text{Supp. of } \mathbb{X} = \{A-B, A+B\}$$

$$f_{\mathbb{X}}(x) = \begin{cases} p & \text{if } x = \underline{A+B} \\ 1-p & \text{if } x = \underline{A-B} \\ 0 & \text{else} \end{cases}$$

PMF

$$E[U_2(\mathbb{X})] = E[1 + \log(\mathbb{X})]$$

$$= 1 + E[\log(\mathbb{X})]$$

$$= 1 + p \cdot \log(A+B) + (1-p) \cdot \log(A-B)$$

$$A = 10$$

$$B = (-5, A)$$

$$p = \begin{cases} 0.4 \\ 0.7 \end{cases}$$

$$\frac{\partial}{\partial B} E[U_2(\mathbb{X})] =$$

$$\frac{\partial}{\partial B} \left[1 + p \log(A+B) + (1-p) \log(A-B) \right]$$

$$\frac{d}{dB} [E u_2(A)] = \frac{A(2\gamma - 1) - B}{(A - B)(A + B)} = 0 \quad (4)$$

$(0 \leq B < A)$

2 solve for B →

$$= 2\left(\gamma - \frac{1}{2}\right)A$$

$$B^* = A(2\gamma - 1) = 2A\left(\gamma - \frac{1}{2}\right)$$

$$(A = 10, \gamma = 0.7) \rightarrow B^* = 20(0.7 - 0.5) = 4 \checkmark$$