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Tugas Pertemuan 11 MatDis

hal. 414 no. 7

7. a. 1 preceds 4 $\rightarrow \{1, 2, 3, 4\}$

$$\left. \begin{array}{l} \text{kasus 1 digit 1} = 3 \cdot 2 \cdot 1 = 6 \\ \text{digit 2} = 2 \cdot 2 \cdot 1 = 4 \\ \text{digit 3} = 2 \cdot 1 \cdot 1 = 2 \end{array} \right\} 12$$

total kemungkinan = 24

jadi ~~probabilitasnya~~ $12/24 = 1/2$
probabilitasnya

b. 4 preceds 1 $\rightarrow \{1, 2, 3, 4\}$

sama seperti bagian a karena masing-masing memiliki ~~jumlah~~ jumlah yg sama sehingga ~~probabilitasnya~~ $= 1/2$
probabilitasnya

c. 4 preceds (1 and 2) $\rightarrow \{1, 2, 3, 4\}$

$$\left. \begin{array}{l} \text{kasus 4 digit ke 1} = 3 \cdot 2 \cdot 1 = 6 \\ \text{ke 2} = 1 \cdot 2 \cdot 1 = 2 \end{array} \right\} 8$$

total kemungkinan = 24

jadi ~~probabilitasnya~~ $8/24 = 1/3$
probabilitasnya

d. 4 preceds 1, 2, 3

kasusnya dimana 4 harus di digit ke 1

$$\text{sehingga} = 3 \cdot 2 \cdot 1 = 6$$

$$\text{jadi probabilitasnya } 6/24 = 1/4$$

e. 4 preceds 3, dan 2 preceds 1

kasus 4 digit ke 1, 2 digit ke 2 = 2.1

— " —, 2 digit ke 3 = 1.1

4 digit ke 2, 2 digit ke 1 = 2.1

— " — ke 3, — " — = 1.1

} 6

$$\text{jadi probabilitasnya } 6/24 = 1/4$$

hal 418 no. 11 dan 12

11. $P(E) = 0,7$ and $P(F) = 0,5$

$$P(E \cup F) \geq P(E) = 0,7$$

$$P(E \cap F) = P(F) \geq 0,2$$

probabilitas terbesar = 1 $\rightarrow P(E \cup F) \leq 1$

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$1 \geq 0,7 + 0,5 - P(E \cap F)$$

$$P(E \cap F) \geq 1,2 - 1$$

$$P(E \cap F) \geq 0,2 \text{ (terbukti)}$$

12. $P(E) = 0,8$ and $P(F) = 0,6$

$$P(E \cup F) \geq 0,8 \rightarrow P(E \cup F) \geq P(E) = 0,8$$

$$P(E \cap F) \geq 0,4 \rightarrow P(E \cap F) \geq P(F) = 0,6$$

probabilitas terbesar = 1 $\rightarrow P(E \cup F) \leq 1$

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$1 \geq 0,8 + 0,6 - P(E \cap F)$$

$$P(E \cap F) \geq 1,4 - 1$$

$$P(E \cap F) \geq 0,4 \text{ (Terbukti)}$$

hal. 416 no. 28

28. probability boy = 0,51 \rightarrow childs = 5

a. (3 boys) , gunakan distribusi binomial

$$R(x, n) = \frac{n!}{(n-x)! x!} \cdot p^x \cdot q^{n-x}$$

$$3 \text{ boys} \rightarrow \frac{5!}{2! 3!} \cdot (0,51)^3 \cdot (0,49)^2$$

$$= \frac{5!}{2! 3!} \cdot (0,51)^3 \cdot (0,49)^2$$

$$= 10 \cdot 0,132651 \cdot 0,2401$$

$$= 0,3185$$

$$P \approx 0,32$$

b. min 1 boys

$$0 \text{ boys} \rightarrow 1 \cdot (0,51)^0 \cdot (0,49)^5$$

$$= 1 - 1 \cdot 0,0282475$$

$$\text{sehingga } 1 - 0,0282475$$

$$P \approx 0,97$$

c. min 1 girl

$$\begin{aligned} \# 0 \text{ girl} &\rightarrow 1 \cdot (0,5)^5 \cdot (0,49)^0 \\ &= 1 \cdot 0,3450 \cdot 1 \\ &= 0,3450 \end{aligned}$$

sehingga $1 - 0,3450 = 0,655$

$P \approx 0,97$

d. semua boys / girl

5 boys \rightarrow ~~1 girl~~ 0 girl = 0,03450

5 girl \rightarrow 0 boys = 0,02824

$$\begin{aligned} P &= 0,03450 + 0,02824 \\ &\approx 0,063 \end{aligned}$$

hal. 424 no. 1, 2, 13, 14

1. $P(E) = 1/3$ $P(F) = 1/2$ $P(E|F) = 2/5$

teorema bayes

$$P(F|E) = \frac{P(E|F)P(F)}{P(E|F)P(F) + P(E|\bar{F})P(\bar{F})}$$

syarat $P(B|A) = \frac{P(A \cap B)}{P(A)}$

$$P(F|E) = \frac{P(E|F)P(F)}{P(E)}$$

$$= \frac{2/5 \cdot 1/2}{1/3}$$

$$= \frac{3}{5}$$

$\approx 0,6$

$$2. \quad P(E) = \frac{2}{3} \quad P(F) = \frac{3}{4} \quad P(F|E) = \frac{5}{8}$$

$$P(E|F) = \frac{P(F|E) P(E)}{P(F)}$$

$$= \frac{\frac{5}{8} \cdot \frac{2}{3}}{\frac{3}{4}}$$

$$= \frac{5}{9}$$

$$\approx 0,56$$

$$13. \quad P(E|F_1) = \frac{1}{8}$$

$$P(E|F_2) = \frac{1}{4}$$

$$P(E|F_3) = \frac{1}{6}$$

$$P(F_1) = \frac{1}{4}$$

$$P(F_2) = \frac{1}{4}$$

$$P(F_3) = \frac{1}{2}$$

$$P(F_j|E) = \frac{P(E|F_j) P(F_j)}{\sum P(E|F_j) P(F_j)}$$

$$j=1 \rightarrow P(F_1|E) = \frac{P(E|F_1) P(F_1)}{\sum_1^3 P(E|F_j) P(F_j) + \dots}$$

$$P(F_1|E) = \frac{\frac{1}{8} \cdot \frac{1}{4}}{\frac{1}{8} \cdot \frac{1}{4} + \frac{1}{4} \cdot \frac{1}{4} + \frac{1}{6} \cdot \frac{1}{2}}$$

$$= \frac{3}{17}$$

$$= \frac{3}{17} \approx 0,17647$$

$$\approx 0,18$$

$$\begin{aligned} 14. \quad P(E|F_1) &= 2/3 & P(F_1) &= 1/6 \\ P(E|F_2) &= 3/8 & P(F_2) &= 1/2 \\ P(E|F_3) &= 1/2 & P(F_3) &= 1/3 \end{aligned}$$

$$\begin{aligned} P(F_2|E) &= \frac{P(E|F_2)P(F_2)}{P(E|F_1)P(F_1) + P(E|F_2)P(F_2) + P(E|F_3)P(F_3)} \\ &= \frac{3/8 \cdot 1/2}{2/3 \cdot 1/6 + 3/8 \cdot 1/2 + 1/2 \cdot 1/3} \\ &= \frac{7}{15} \end{aligned}$$

$$\begin{aligned} &= 0,466667 \\ &\approx 0,46 \end{aligned}$$