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probability and statistics

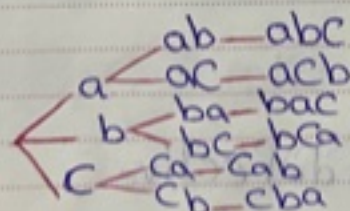
H.W 2

- 1) 12 student — 3 tests — test per 4 student
Solve
arrangement not important

$${}^{12}C_4 \times {}^8C_4 \times {}^4C_4$$

$$\frac{12!}{8! \cdot 4!} \times \frac{8!}{4! \cdot 4!} \times 1$$
$$= \frac{5 \times 7 \times 4 \times 1 \times 1}{1} = 34650 \quad \#$$

2)



$${}_3P_3 = \frac{n!}{(n-r)!}$$
$$= \frac{3!}{0!}$$
$$= 2 \times 3 = 6 \quad \#$$

$$3) P(A) = \frac{{}^4C_2}{{}^{12}C_2} = \frac{1}{11}$$

$$P(B) = \frac{{}^8C_2}{{}^{12}C_2} = \frac{14}{33}$$

(at least one item is defective)

$$= \left(1 - \frac{14}{33}\right) = \frac{19}{33}$$

4) 15 item — 5 defective — 10 — non defective —
select 3 items

i) Three item non-defective

$${}^{10}C_3 = {}^{15}C_3 = \frac{24}{91}$$

ii) one item of three item is defective

$$\frac{{}^5C_1 \times {}^{10}C_2}{{}^{15}C_3} = \frac{45}{91}$$

iii) at least one of item is defective

$$1 - \frac{24}{91} = \frac{67}{91}$$

$$5) P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$P(A) \rightarrow$ boy

$P(B) \rightarrow$ From Mansoura

$$P(A) = \frac{5/10}{30/10} = \frac{1}{6}$$

$$P(B) = \frac{15}{30} = \frac{1}{2}$$

$$P(A \cap B) = \frac{5}{30} = \frac{1}{6}$$

$$P(A \cup B) = \frac{1}{6} + \frac{1}{2} - \frac{1}{6} = \frac{2}{3} \#$$

$$6) P(A) = 3/8 \quad P(B) = 1/2 \quad P(A \cap B) = 1/2$$

$$P(A^c) = 5/8$$

$$P(B^c) = 1/2$$

$$P(A^c \cap B^c) = P(A \cup B) \rightarrow \text{De Morgan}$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 3/8 + 1/2 - 1/2$$

$$= 3/8$$

$$P(A^c \cup B^c) = P(A \cap B) = 1/2$$

$$P(A \cap B^c) = P(A) = 3/8 \quad P(B^c) = 1/2$$

7) pair of dice \rightarrow 3 times at least you roll a 7?

$$\frac{28}{36} \times \frac{24}{36} \times \frac{30}{36} = \frac{1}{8} = \frac{1}{8}$$

$$\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}$$

$$\frac{1}{8} \times \frac{1}{8} \times \frac{1}{8} = \frac{1}{512}$$

$$= \frac{1}{512} + \frac{1}{8} + \frac{1}{36} = \frac{43}{512}$$

$$8) \sum P(x) = k^2 - 8$$

$$1 = k^2 - 8$$

$$k^2 = 9$$

$$k = 3$$

9) A, B mutually exclusive $P(A) = 0,35$

$$P(B) = 0,45 \quad P(A \cap B) = P(A \cup B)$$

$$P(A \cup B) = P(A) + P(B)$$

$$= 0,45 + 0,35 = 0,8$$