Birzeit University
Faculty of Engineering and Technology
Department of Electrical and Computer Engineering
Probability and Engineering Statistics – ENEE 2307
Quiz #1 (Form A)

28 October 2024   Dr. Jaser Sa'ed   Time: 10 min

Student Name: Key Solution   ID Number:

Question #1:

A, B and C are mutually exclusive (disjoint) and equiprobable (have equal probability) events such that $P(A \cup B \cup C) = 1$. Compute $P(A \cup B)$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$\quad\quad\quad = P(A) + P(B) - 0 \quad\leftarrow\text{disjoint}$
$\quad\quad\quad = P + P = 2P \quad ((P(A) = P(B) = P \Rightarrow \text{equiprobable}))$

$P(A \cup B \cup C) = P(A) + P(B) + P(C) \quad\leftarrow\text{since disjoint}$
$1 \quad\quad = P + P + P = 3P \quad ((\text{have equal prob}))$

$\Rightarrow \boxed{P = \frac{1}{3}}$

$\therefore P(A \cup B) = 2P = 2\left(\frac{1}{3}\right) = \frac{2}{3}$

Question #2:

Given three independent events A, B, and C such that P(A)=0.6, P(B)=0.5, and P(C)=0.4.

a) Find $P(A/B) = \dfrac{P(A \cap B)}{P(B)} = \dfrac{P(A) \cdot P(B)}{P(B)} = P(A)$ A, B independent
$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad = 0.6$

b) Find the probability that at least one event occurs.

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

$= 0.6 + 0.5 + 0.4 - (0.6)(0.5) - (0.6)(0.4) - (0.5)(0.4)$
$+ (0.6)(0.5)(0.4)$

$= 1.5 - 0.3 - 0.24 - 0.2 + 0.12$

$= 0.88$

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