K19FG-22-JAN

Friday, January 22, 2021
12:54 PM

Continued from previous lecture :-

$\because$ $B \cap C = \{1, 3, 5\} \times \{2, 4, 6\} = 3 \times 3 = 9$

Note :-

Even + Even = Even
odd + odd = Even

$\boxed{\text{odd} + \text{Even} = \text{odd}}$ #
Even + odd = odd

$\Rightarrow |B \cap C| = 9 \Rightarrow P(B \cap C) = \frac{9}{36} = \frac{1}{4}$

Again $A \cap C = \{1, 3, 5\} \times \{2, 4, 6\} = 3 \times 3 = 9$

$\Rightarrow P(A \cap C) = \frac{9}{36} = \frac{1}{4}$

$\because A = \{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), \_\_\_\_\_\_ \}$

$B = \{(1,1), (2,1), (3,1), (4,1), (5,1), (6,1), (1,3), (2,3), (3,3), (4,3), (5,3), (6,3), \_\_\_\_\_\_ \}$

$A \cap B = \{(1,1), (1,3), (1,5), (3,1), (3,3), (3,5), (5,1), (5,3), (5,5)\}$

$C = \{(1,2), (1,4), (1,6), (2,1), (2,3), (2,5), ------ \}$

$\because$ $A \cap B$ contains ordered pair with both numbers odd but in C atleast one number is even.

$\Rightarrow$ There is no common element in $A \cap B$ and C.

$\Rightarrow A \cap B \cap C = \phi$

$\Rightarrow \boxed{P(A \cap B \cap C) = 0}$

$\therefore$ $P(A \cap B \cap C) = P(A) \cdot P(B) \cdot P(C)$

$0 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

$\boxed{0 \neq \frac{1}{8}}$

$\Rightarrow$ A, B, C are not mutually Independent.

But A, B, C are pairwise independent as

$P(A \cap B) = P(A) \cdot P(B)$

$P(B \cap C) = P(B) \cdot P(C)$

$P(A \cap C) = P(A) \cdot P(C)$

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Qu 1. Match the correct option.

(a) Atleast one of the event

(b) Neither A nor B

(c) Exactly one of the event

(d) If A occure, so does B

(e) Not more than one of A or B

(i) $(\bar{A} \cap B) \cup (A \cap \bar{B}) \cup (\bar{A} \cap \bar{B}) \rightarrow e$

(ii) $(A \cup B) - (A \cap B)$

(iii) $\boxed{A \subset B} \longrightarrow d$

(iv) $B \subset A$

(v) $\{A - (A \cap B)\} \cup \{B - A \cap B\}$ — c

(vi) $\bar{A} \cap \bar{B} \longrightarrow b$

(vii) $A \cup B \longrightarrow a$

(viii) $S - (A \cup B)$

(viii) $S-(A\cup B)$

Explanation :- $\boxed{(A\cap\bar{B})\cup(\bar{A}\cap B)}$ = Exactly one of A or B

Note :- $A-B = \underline{A\cap\bar{B}}$ #

$A-B = A-(A\cap B)$ #

$A-B = A\cup B - B$

$P(A-B) = P(A\cap\bar{B})$

$\boxed{P(A-B) = P(A) - P(A\cap B)}$

(v) $(A-A\cap B)\cup(B-A\cap B)$

$\boxed{(A\cap\bar{B})\cup(B\cap\bar{A})}$ = C option

(ii) (a) $P(\phi)$

(b) $P(A|B)\cdot P(B)$

(c) $P(\bar{A})$

(d) $P(\bar{A}\cap\bar{B})$

(e) $P(A-B)$

(i) $1-P(A) \rightarrow$ (c)

(ii) $P(A\cap B) \rightarrow$ (b)

(iii) $P(A) - P(A\cap B) \longrightarrow$ (e)

(iv) $0 \rightarrow$ (a)

(v) $1-P(A)-P(B)+P(A\cap B) \longrightarrow$ (d)

Q4 If $P(A\cap B) = \underline{0} \Rightarrow$ A and B are

× (i) Independent

✓ (ii) dependent and mutually Exclusive

× (iii) dependent but not mutually Exclusive.

× (iv) None of these.

$\boxed{A\cap B \neq \phi}$

If $\boxed{A\cap B = \phi}$ then Dependent

$A\cap B = \phi$