

Assignment-1

AI1110: Probability and Random Variables

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Solution

(i) E denotes the event that the card drawn is spade

$$P(E) = \frac{13}{52} = \frac{1}{4} \quad (1)$$

F denotes the event that card drawn is ace

$$P(F) = \frac{4}{52} = \frac{1}{13} \quad (2)$$

$$P(E \cap F) = \frac{1}{52} \quad (3)$$

$$P(E).P(F) = \frac{1}{4} \times \frac{1}{13} = \frac{1}{52} \quad (4)$$

$$\therefore P(E \cap F) = P(E).P(F) \quad (5)$$

\therefore E and F are independent events.

(ii) E denotes the event that the card drawn is black

$$P(E) = \frac{26}{52} = \frac{1}{2} \quad (6)$$

F denotes the event that card drawn is a king

$$P(F) = \frac{4}{52} = \frac{1}{13} \quad (7)$$

$$P(E \cap F) = \frac{2}{52} = \frac{1}{26} \quad (8)$$

$$P(E).P(F) = \frac{1}{2} \times \frac{1}{13} = \frac{1}{26} \quad (9)$$

$$\therefore P(E \cap F) = P(E).P(F) \quad (10)$$

\therefore E and F are independent events.

(iii) E denotes the event that the card drawn is king or queen

$$P(E) = \frac{8}{52} = \frac{2}{13} \quad (11)$$

F denotes the event that card drawn is a queen or jack

$$P(F) = \frac{8}{52} = \frac{2}{13} \quad (12)$$

$$P(E \cap F) = \frac{4}{52} = \frac{1}{13} \quad (13)$$

$$P(E).P(F) = \frac{2}{13} \times \frac{2}{13} = \frac{4}{169} \quad (14)$$

$$\therefore P(E \cap F) \neq P(E).P(F) \quad (15)$$

\therefore E and F are not independent events.