Assignment 5

Varun Gupta
cs21btech11060

May 16, 2022

Outline

Exercise 13.2

Q.10

Events A and B are such that $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}$ and $P(\overline{A}) + P(\overline{B}) = \frac{1}{4}$. State whether A and B are independent?

Solution:

For two events to be independent, We know

$$P(A)P(B) = P(AB) \tag{1}$$

Also,

$$P(\overline{A}) + P(\overline{B}) = \overline{P(AB)} = \frac{1}{4} \tag{2}$$

$$\Rightarrow P(AB) = 1 - \frac{1}{4} = \frac{3}{4} \tag{3}$$

But,

$$P(A)P(B) = \frac{1}{2} \times \frac{7}{12} = \frac{7}{24} \tag{4}$$

Hence, A & B are not independent events.

```
P_A = 1/2
P_B = 7/12
P_nor_A_or_nor_B = 1/4
P_A_intersection_B = 1 - P_nor_A_or_nor_B
if P_A*P_B == P_A_intersection_B:
    print("A and B are independent events")
print("A and B are not independent events")
```