Assignment 5

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Outline

Abstract

This document contains the solution to Exercise 13.2 Question 11 of Chapter 13 (Probability) in the NCERT Class 12 Exemplar.

Ex 13.2 Q)11: Given two independent events A and B such that $\Pr(A) = 0.3$, $\Pr(B) = 0.6$. Find

i. $\Pr(AB)$
ii. $\Pr(AB')$
iii. $\Pr(A + B)$
iv. $\Pr(A'B')$

Solution:

(i) Since A and B are independent events.

$$\Pr(AB) = \Pr(A) \times \Pr(B) \tag{1}$$
$$\Pr(AB) = 0.3 \times 0.6 \tag{2}$$
$$\Pr(AB) = 0.18 \tag{3}$$

(ii)

$$A = A(B + B') \tag{4}$$
$$A = AB + AB' \tag{5}$$

Since AB and AB' are mutually exclusive events $\therefore$

$$\Pr(A) = \Pr(AB) + \Pr(AB') \tag{6}$$
$$\Pr(AB') = \Pr(A) - \Pr(AB) \tag{7}$$
$$\Pr(AB') = 0.3 - 0.18 \tag{8}$$
$$\Pr(AB') = 0.12 \tag{9}$$

$$AB' + B = (B + B')(B + A) \tag{10}$$
$$AB' + B = B + A \tag{11}$$
$$\Pr(A + B) = \Pr(AB' + B) \tag{12}$$

Since AB' and B are mutually exclusive events $\therefore$

$$\Pr(A + B) = \Pr(AB') + \Pr(B) \tag{13}$$

Substituting $\Pr(AB')$,

$$\Pr(A + B) = \Pr(B) + \Pr(A) - \Pr(AB) \tag{14}$$
$$\Pr(A + B) = 0.3 + 0.6 - 0.18 \tag{15}$$
$$\Pr(A + B) = 0.72 \tag{16}$$

(iv) By De-Morgan's Principle-

$$\Pr\left(A'B'\right) = \Pr\left((A+B)'\right) \tag{17}$$

$$\Pr\left(A'B'\right) = 1 - 0.72 \tag{18}$$

$$\Pr\left(A'B'\right) = 0.28 \tag{19}$$