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Assignment-I

Problem Statement:

A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is even, ' and B be the event, ' the number is red '. Are A and B independent?

Solution:

Given, a die marked 1,2,3 in red and 4,5,6 in green is tossed.Let A be the event, 'the number is even, ' and B be the event, ' the number is red '.

$$\mathbf{S} = \{1, 2, 3, 4, 5, 6\} \tag{1}$$

Let two events be

A : the number is even
B : the number in red

Now, two events A and B are independent if it satisfy the following condition,

$$\Pr(AB) = \Pr(A) \,.\, \Pr(B) \tag{2}$$

$$\begin{aligned} \mathrm{A} &= \{2, 4, 6\} \\ \mathrm{B} &= \{1, 2, 3\} \end{aligned}$$

$$\Pr(AB) = \frac{1}{6} \tag{3}$$

$$\Pr(A) = \frac{3}{6} = \frac{1}{2} \tag{4}$$

$$\Pr(B) = \frac{3}{6} = \frac{1}{2} \tag{5}$$

Now,

$$\Pr(A) \,.\, \Pr(B) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4} \tag{6}$$

From (3) and (6)

$$\Pr(AB) \neq \Pr(A) \,.\, \Pr(B) \tag{7}$$

$\therefore$ Therefore, the events A and B are not independent.