

Assignment 1

AI1110: Probability and Random Variables

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Chapter 13 , Exercise 13.2

Question 17 :

The Probability of obtaining an even prime number on each die , when a pair of dice is rolled is :

- A) 0
- B) $\frac{1}{3}$
- C) $\frac{1}{12}$
- D) $\frac{1}{36}$

Solution:

Let X and Y be two random variables representing outcomes on both the die,

$$X \in \{1, 2, 3, 4, 5, 6\} \quad (1)$$

$$Y \in \{1, 2, 3, 4, 5, 6\} \quad (2)$$

$\Pr(X = 2)$	The probability of occurrence of 2 on die roll 1.
$\Pr(Y = 2)$	The probability of occurrence of 2 on die roll 2.
$\Pr(X = 2, Y = 2)$	The probability of occurrence of 2 on both the die.

TABLE 0

As both die rolls are independent :

$$\Pr(AB) = \Pr(A)\Pr(B)$$

Now,

$$\Pr(X = 2) = \frac{1}{6} \quad (3)$$

$$\Pr(Y = 2) = \frac{1}{6} \quad (4)$$

$$\Pr(X = 2, Y = 2) = \Pr(X = 2) \Pr(Y = 2) = \frac{1}{6} \times \frac{1}{6} \quad (5)$$

$$\therefore \text{Required probability} = \frac{1}{36} \quad (6)$$