Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

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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 such that,

$$X = \begin{cases} 0, & \text{if number is not an even prime number on dice 1} \\ 1, & \text{if number is even prime number on dice 1} \end{cases} \tag{1}$$

$$Y = \begin{cases} 0, & \text{if number is not an even prime number on dice 2} \\ 1, & \text{if number is even prime number on dice 2} \end{cases} \tag{2}$$

$\Pr(X = 1, Y = 1)$ represents the probability of occurence of even prime number on both the dice.
Both die rolls are independent.
Now,

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

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

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

$\therefore$ Required probability is $\frac{1}{36}$