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 representing outcomes on both the die,

$$X \in \{1, 2, 3, 4, 5, 6\} \tag{1}$$

$$Y \in \{1, 2, 3, 4, 5, 6\} \tag{2}$$

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

As both die rolls are independent :
$\Pr(AB)$=$\Pr(A)\Pr(B)$
Now,

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

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

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

$$\therefore \text{Required probability} = \frac{1}{36} \tag{6}$$