

AI1110 Assignment-6

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Abstract—This document contains the solution of CBSE Class 12 Probability Exercise 13.1 Question 14.

EXERCISE 13.1.14 : Given that the two numbers appearing on throwing two dice are different. Find the probability of the event ‘the sum of numbers on the dice is 4’.

Solution:

The sample space on throwing two dices is given by

$$\mathcal{S} = \{(x, y) : x, y \in \{1, 2 \dots 6\}\} \quad (1)$$

$$\therefore |\mathcal{S}| = 6 \times 6 = 36 \quad (2)$$

Let, A represents the event ‘the sum of numbers on the dice is 4’ and B represents the event ‘the two numbers appearing on throwing two dice are different’.

Let, Denote the random variables as $X \in \{0, 1\}$, where $X = 0$ denote that the event A occurs and $X = 1$ denote that the event B occurs.

The event $X = 0$ is given by

$$A = \{(x, y) : x + y = 4 \text{ \& } x, y \in \{1, 2 \dots 6\}\} \quad (3)$$

$$= \{(1, 3), (2, 2), (3, 1)\} \quad (4)$$

$$\therefore |A| = 3 \quad (5)$$

The event $X = 1$ is given by

$$B = \{(x, y) : x \neq y \text{ \& } x, y \in \{1, 2 \dots 6\}\} \quad (6)$$

$$\therefore |B| = 30 \quad (7)$$

The event $X = 0 \text{ \& } X = 1$ is given by

$$A \cap B = \{(1, 3), (3, 1)\} \quad (8)$$

$$\therefore |A \cap B| = 2 \quad (9)$$

The probabilities of above events is calculated in Table I

Probability	Value
$\Pr(X = 0)$	$\frac{3}{36}$
$\Pr(X = 1)$	$\frac{30}{36}$
$\Pr(X = 0, X = 1)$	$\frac{2}{36}$
$\Pr(X = 0 X = 1)$?

TABLE I
PROBABILITIES

Hence required probability is

$$\Pr(X = 0|X = 1) = \frac{\Pr(X = 0, X = 1)}{\Pr(X = 1)} \quad (10)$$

$$= \frac{\frac{2}{36}}{\frac{30}{36}} \quad (11)$$

$$= \frac{2}{30} \quad (12)$$

$$= \frac{1}{15} \quad (13)$$