

Assignment 3

AI1110: Probability and Random Variables

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12.13.1.14: 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:

When pair of dice are thrown, there are $6 \times 6 = 36$ outcomes.

Let A and B represent the random variables of number appearing on first die and second die.

Let X represent the random variable of sum of numbers after rolling.

(a) pmf of sum X is

$$p_X(i) = \begin{cases} \frac{i-1}{36} & \text{for } i \in \{2, 3, 4, 5, 6, 7\}, \\ \frac{13-i}{36} & \text{for } i \in \{8, 9, 10, 11, 12\} \end{cases} \quad (1)$$

(b) The numbers appearing on two dice are different mean $A \neq B$, finding its probability

$$\Pr(A \neq B) = \frac{30}{36} \quad (2)$$

(c) required probability is

$$\Pr(X = 4|A \neq B) = \Pr(A = 1, B = 3|A \neq B) + \Pr(A = 2, B = 2|A \neq B) + \Pr(A = 3, B = 1|A \neq B)$$

$$\begin{aligned} &= \frac{\Pr(A = 1, B = 3) + \Pr(A = 3, B = 1)}{\Pr(A \neq B)} \end{aligned} \quad (3)$$

$$= \frac{\frac{1}{36} + \frac{1}{36}}{\frac{30}{36}} \quad (4)$$

$$= \frac{2}{30} = \frac{1}{15} \quad (5)$$

$$(6)$$