

Assignment 1

AI1110: Probability and Random Variables
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Question

Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as (i) number greater than 4. (ii) six appears on at least one die.

Solution

When a die is tossed two times, we obtain $(6 \times 6) = 36$ number of sample points. Let X be the random variable which denote the number greater than 4 in two tosses of a die. So X may have values 0, 1 or 2. Now,

$$P(X=0) = P(\text{number less than or equal to 4 on both the tosses}) \\ = \frac{4}{6} \times \frac{4}{6} = \frac{16}{36} = \frac{4}{9}$$

$$P(X=1) = P(\text{number less than or equal to 4 on first toss and greater than 4 on second toss}) + P(\text{number greater than 4 on first toss and less than or equal to 4 on second toss}) \\ = \frac{4}{6} \times \frac{2}{6} + \frac{4}{6} \times \frac{2}{6} = \frac{16}{36} = \frac{4}{9}$$

$$P(X=2) = P(\text{number greater than 4 on both the tosses}) = \frac{2}{6} \times \frac{2}{6} = \frac{4}{36} = \frac{1}{9}$$

Probability distribution of X , i.e., number of successes is

x	0	1	2
$P(x)$	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$

Let X be the random variable which denotes the number of six appears on atleast one die. So, X may have values 0 or 1.

$$P(X=0) = P(\text{six does not appear on any of the die})$$

$$= \frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$$

$$P(X=1) = P(\text{six appears on atleast one of the die}) = \frac{11}{36}$$

Thus , the required probability distribution is as follows

x	0	1
$P(x)$	$\frac{25}{36}$	$\frac{11}{36}$