

Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

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Question[12.13.5.11]: Find the probability of getting 5 twice in 7 throws of a dice.

Solution: : The repeated tossing of a die are Bernoulli trials. Let X represent the number of times of getting 5 in 7 throws of a die.

Probability of getting 5 in a single throw of die, $p = \frac{1}{6}$.

$$\therefore q = 1 - p = 1 - \frac{1}{6} = \frac{5}{6} \quad (1)$$

Clearly, X has the probability distribution with $n = 7$ and $p = \frac{1}{6}$

$$\therefore \Pr(X = x) = {}_nC_x \times q^{n-x} \times p^x = {}_7C_x \times \left(\frac{5}{6}\right)^{(7-x)} \times \left(\frac{1}{6}\right)^x \quad (2)$$

Probability of getting 5 twice in 7 throws of a dice is $\Pr(X = 2)$.

$$\Pr(X = 2) = {}_7C_2 \times \left(\frac{5}{6}\right)^{(7-2)} \times \left(\frac{1}{6}\right)^2 \quad (3)$$

$$= \frac{7!}{2! \times (7-2)!} \times \left(\frac{5}{6}\right)^5 \times \left(\frac{1}{6}\right)^2 \quad (4)$$

$$= 21 \times \left(\frac{5}{6}\right)^5 \times \left(\frac{1}{36}\right) \quad (5)$$

$$= \left(\frac{7}{12}\right) \times \left(\frac{5}{6}\right)^5 \quad (6)$$