

# Assignment 1

AI1110: Probability and Random Variables  
Indian Institute of Technology Hyderabad

Kudupudi D.V.Sai Aditya  
AI22BTECH11013

**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  $p = \frac{1}{6}$

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

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

$$\Pr(X = 2) = {}^7C_2 \times \left(\frac{5}{6}\right)^{(7-2)} \times \left(\frac{1}{6}\right)^2 \quad (3)$$

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

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

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