Assignment 7

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***Abstract*—This document contains 11^{th} problem from exercise 13.5 of CBSE Class 12 (Probability)**

Problem 1. ***Exercise*** 13.5 ***Problem*** 11

Find the probability of getting 5 exactly twice in 7 throws of a die

Solution: The repeated throws of a die are Bernoulli trials. Let X denote the number of $5's$ in an experiment of 7 trials.
Clearly X has the binomial distribution with $n = 7$ and $p = \frac{1}{6}$
Therefore

$$P(X = x) = \binom{n}{x} \times p^x \times q^{n-x} \tag{1}$$

Here

$$n = 7 \tag{2}$$

$$p = \frac{1}{6} \tag{3}$$

$$q = 1 - p = \frac{5}{6} \tag{4}$$

and

$$x = 2 \tag{5}$$

Therefore
From (1), (2), (3), (4) and (5),

$$P(X = 2) = \binom{7}{2} \times \left(\frac{1}{6}\right)^2 \times \left(\frac{5}{6}\right)^{7-2} \tag{6}$$

$$= \frac{65625}{6^7} \tag{7}$$

$$= \frac{21875}{2 \times 6^6} \tag{8}$$

The following graphs are **PMF** graph and **CDF** graph for the above distribution respectively.

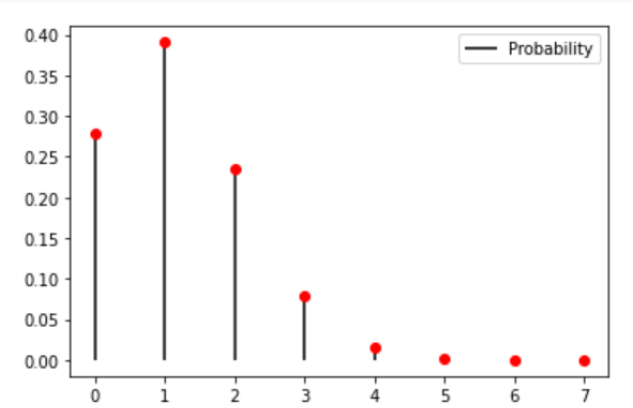

Fig. 1: Probability Mass Function (PMF)

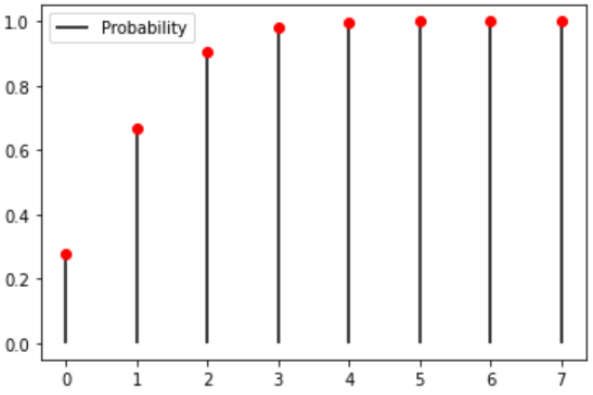

Fig. 1: Cumulative Distribution Function (CDF)