Assignment 5

IC252 - IIT Mandi

Submission Deadline: 15 April, 2021

1. (Continuation of Problem 4, Assignment 4) A fair coin is tossed four times, and the random variable X is the number of heads in the first three tosses and the random variable Y is the number of heads in the last three tosses.

   What are the expectations and variances of the random variables X and Y ? **[2]**

2. (Continuation of Problem 5, Assignment 4) Two cards are drawn without replacement from a pack of cards, and the random variable X measures the number of hearts drawn and the random variable Y measures the number of clubs drawn.

   What are the expectations and variances of the random variables X and Y ? **[2]**

3. Show that the variance of a binomially distributed r.v. $X \sim \text{Bin}(n, p)$ is **[3]**

$$\text{Var}(X) = np(1-p).$$

4. Suppose that the probabilities are 0.4, 0.3, 0.2, and 0.1, respectively, that IIT Mandi has 0, 1, 2, or 3 power failures in any given month. Find the mean and variance of the random variable X representing the number of power failures at IIT Mandi. **[2]**

5. Let X and Y be independent r.v.s with $\text{Var}(X) = \text{Var}(Y) = 3$. Find $\text{Var}(2X - 3Y + 1)$. **[2]**

6. For a Poisson distributed r.v., find:

   (a) Mean **[2.5]**

   (b) Variance **[2.5]**