

# Session 13:

## Additional Exercise

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## 1. Introduction

This assignment will help you to consolidate the concepts learnt in the session.

## 2. Problem Statement

Problem Statement 1: [100 marks]

A company manufactures LED bulbs with a faulty rate of 30%. If I randomly select 6 chosen LEDs, what is the probability of having 2 faulty LEDs in my sample? Calculate the average value of this process. Also evaluate the standard deviation associated with it.

Problem Statement 2: [100 marks]

Gaurav and Barakha are both preparing for entrance exams. Gaurav attempts to solve 8 questions per day with a correction rate of 75%, while Barakha averages around 12 questions per day with a correction rate of 45%. What is the probability that each of them will solve 5 questions correctly? What happens in cases of 4 and 6 correct solutions? What do you infer from it? What are the two main governing factors affecting their ability to solve questions correctly? Give a pictorial representation of the same to validate your answer.

Problem Statement 3: [100 marks]

Customers arrive at a rate of 72 per hour to my shop. What is the probability of  $k$  customers arriving in 4 minutes? a) 5 customers, b) not more than 3 customers, c) more than 3 customers. Give a pictorial representation of the same to validate your answer.

Problem Statement 4: [100 marks]

I work as a data analyst in Aeon Learning Pvt. Ltd. After analyzing data, I make reports, where I have the efficiency of entering 77 words per minute with 6 errors per hour. What is the probability that I will commit 2 errors in a 455-word financial report?

What happens when the no. of words increases (in case of 1000 words) or decreases (255 words)? How is the  $\lambda$  affected? How does it influence the PMF? Give a pictorial representation of the same to validate your answer.

Problem Statement 5: [100 marks]

The current measured in a copper wire is modelled by a continuous random variable  $X$  is in milliamperes. Assume that the range of  $X$  is  $[0, 20 \text{ mA}]$ . The probability density function is given by,  $f(x) = 0.05$  for  $0 \leq x \leq 20$ . What is the probability that a current measurement is less than 10 milliamperes? Draw the PDF and the CDF diagrams as well.

Note: Solution submitted via github must contain all the detailed steps.

Marks will also depend on the usage of suitable notations and expressions.

## 3. Output: N/A