**Problem Statement 1:**

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.

**Solution 1:** Let X be the random variable representing faulty bulbs in a sample

1. , therefore the probability is given by
2. The average value is given by
3. The standard deviation associated with it is given by

**Problem Statement 2**

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.

Solution 2:

1. , therefore the probability is given by
2. , therefore the probability is given by

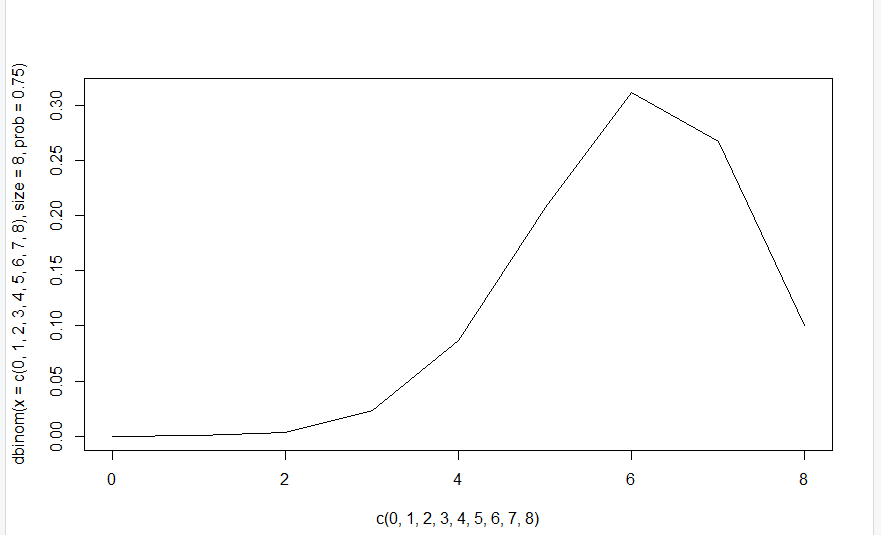
*What happens in cases of 4 and 6 correct solutions?*

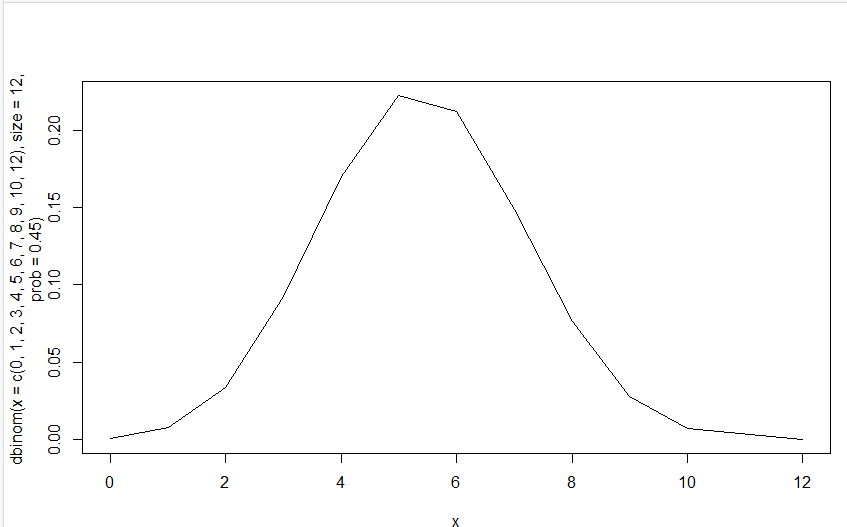
In cases of 4 and 6 probabilities of getting 6 correct is much higher than that of getting 4 correct

*What are the two main governing factors affecting their ability to solve questions correctly?*

* Number of trials
* Probability of correction

**Pictorial View**





**Problem Statement 3**

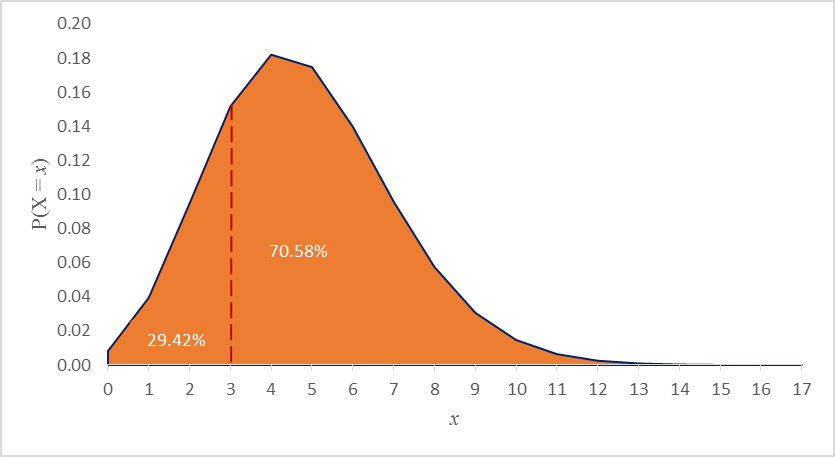
Customers arrive at a rate of 72 per hour to my shop. What is the probability of k customers arriving in 4 minutes? a) 5 customers, b) not more than 3 customers, c) more than 3 customers.

Give a pictorial representation of the same to validate your answer.

**Solution 3:** Let X be the random variable that represents the number of customers who arrive at a shop. , thus




2. The pictorial view of this is given by



**Problem Statement 4**

I work as a data analyst in Aeon Learning Pvt. Ltd. After analysing 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 λ affected? How does it influence the PMF? Give a pictorial representation of the same to validate your answer.

Solution 4:

At 77 words per minute, it means in an hour the analyst will type 4260 words, in which he is susceptible to 6 errors. Let be the randon variable that represents the number of errors in an hour at 77 words per minute (4260 per hour)

Thus

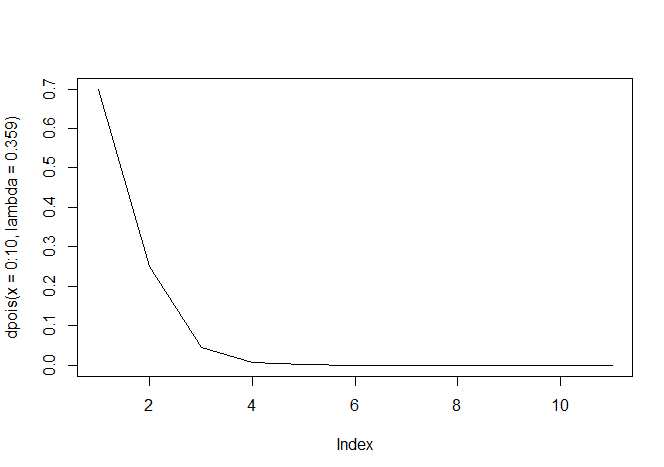
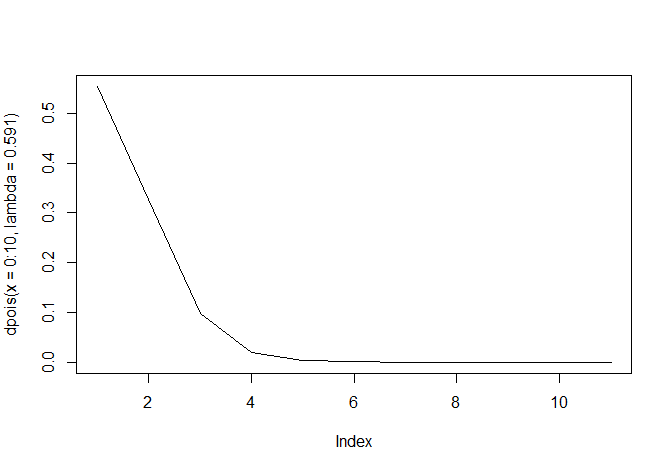
1. For a 455 word document, the error rate becomes lower i.e., thus

1. For a 1000 word document, the error rate becomes, thus
2. For a 255 word document, the error rate becomes, thus

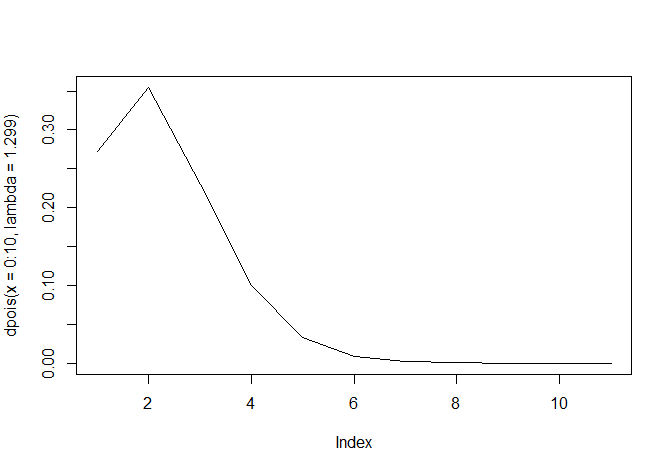
The likelihood of making 2 errors increases as the number of words increases and decreases as the number of words in a document decreases.

How does it influence the PMF?

255 words 455 words

1000 words



**Problem Statement 5**

*The current measured in a copper wire is modelled by a continuous random variable (is in mA.) Assume that the range of X is [0, 20mA]. The probability density function is given by. What is the probability that a current measurement is less than 10 milliamperes? Draw the PDF and the CDF diagrams as well.*

a)

b)

The PDF diagram is as follows c) The CDF diagram is given below

