Sheet – II

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

⇒ faulty Rate = 30%

Probability of faulty Rate = 0.3

$n = 6$

Probability of success rate = $1 - p = 1 - 0.3$
$= 0.7$

Probability of having 2 faulty in sample.

$= {}^6C_2 \times (0.3)^2 \times (0.7)^4$

$= \frac{6!}{2!\,4!} \times (0.3)^2 \times (0.7)^4$

$= \frac{6 \times 5 \times 4!}{2 \times 1 \times 4!} \times (0.3)^2 \times (0.7)^4$

$= 15 \times 0.09 \times (0.7)^4$

$= 0.324135$

Average value: $\mu = np = 6 \times 0.3$
$= 1.8$

Standard Deviation $\sigma = \sqrt{np(1-p)}$

$= \sqrt{6 \times 0.3 \times 0.7}$

$= 1.1225$

② Solution: ...
No of ques...
Correction ...
Probability ...
Probability ...
P(x) ...
P(5) = ...

Barka: ...
No of ...
Corre...
Proba...
Proba...
P(...

(2) Solution: Aourav:

No of question per day (n) = 8

correction Rate = 75% = 0.75

Probability of incorrect answer = 1 − 0.75 = 0.25

Probability to solve 5 question correct.

$$P(x) = {}^{n}C_{x} \times p^{x} \times (1-p)^{n-x}$$

$$P(5) = {}^{8}C_{5} \times (0.75)^{5} \times (0.25)^{8-5}$$

$$= \frac{8!}{5! \times (8-5)!} \times (0.75)^{5} \times (0.25)^{3}$$

$$= \frac{8 \times 7 \times 6 \times 5!}{5! \times 3!} \times (0.75)^{5} \times (0.25)^{3}$$

$$= 56 \times 0.237305 \times 0.015625$$

$$= 0.207641602.$$

Barka:

No of question per day $n = 12$

Correction Rate = 45% = 0.45

Probability of incorrect = $1 - p = 1 - 0.45 = 0.55$

Probability to solve 5 question correctly,

$$P(5) = {}^{12}C_{5} \times (0.45)^{5} \times (0.55)^{12-5}$$

$$= 792 \times (0.45)^{5} \times (0.55)^{7}$$

$$= 0.2225$$

Probability of answering 4 questions correctly by Gaurav:-

$$P(4) = {}^{8}C_4 \times (0.75)^4 \times (0.25)^{4}$$

$$= 70 \times (0.75)^4 \times (0.25)^4$$

$$= 0.0865$$

Probability of answering 4 questions correctly by Barak

$$P(4) = {}^{12}C_4 \times (0.45)^4 \times (0.55)^{12-4}$$

$$= 495 \times (0.45)^4 \times (0.55)^8$$

$$= 0.16996$$

$$\Rightarrow 0.17$$

Probability of answering 6 question correctly by Gaurav

$$P(6) = {}^{8}C_6 \times (0.75)^6 \times (0.25)^{8-6}$$

$$= 28 \times (0.75)^6 \times (0.25)^2$$

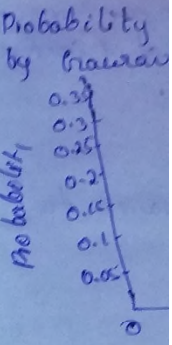
$$= 0.3115$$

Probability of answering 6 questions correctly by Barak

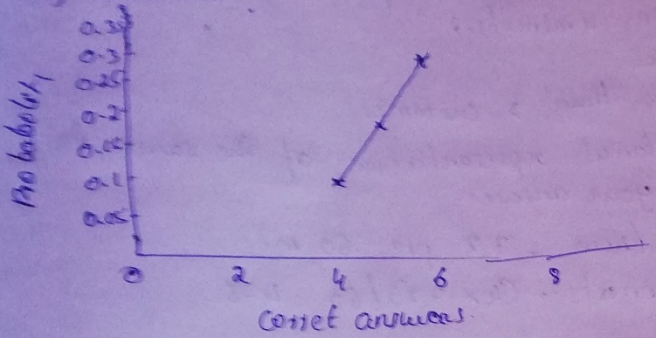
$$P(6) = 12C_6 \times (0.45)^6 \times (0.55)^{12-6}$$

$$= 925 \times (0.45)^6 \times (0.55)^6$$

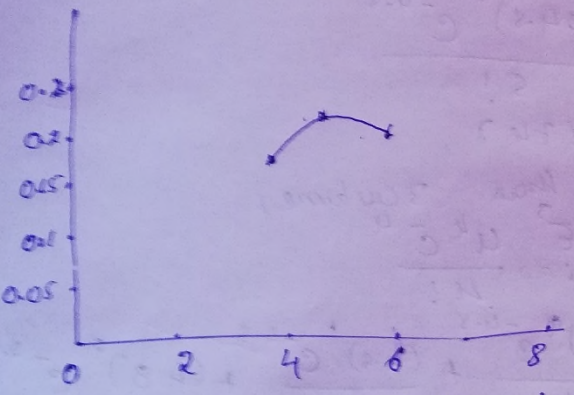
$$= 0.2124$$



Probability of answering correct answers by Tanveer



Probability of answering correct answer by Barakha



* Number of questions attended and correction Rate two main factors affecting their ability.
* Correction Rate is important rather than number of questions attended. In case of Barakha. he has ability to answer 12 question per day. But th correction Rate is less.

There is no point in answering all the questions with wrong answers, so if correction Rate is good, The probability of answering a question will be good.

③ Customer arrive at a Rate of 72 per hour to my shop. What is the probability of 4 customers arriving in 4 minutes.?

ⓐ 5 customs

ⓑ no more than 3 customes.

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

⇒ $\lambda = 72/\text{hour} = 72 \text{ per } 60 \text{ min.}$

for 4 minutes $= (4 * 72)/60 = 4.8$

a) 5 customs

$$P(5) = \frac{\lambda^k e^{-\lambda}}{k!}$$

$$= \frac{(4.8)^5 e^{-4.8}}{5!}$$

$$= 0.1747.$$

b) not more than 3 customes

$$P(k \leq 3) = \sum_{i=0}^{3} \frac{\lambda^k e^{-\lambda}}{k!}$$

$$= \frac{(4.8)^0 e^{-4.8}}{0!} + \frac{(4.8)^1 e^{-4.8}}{1!} + \frac{(4.8)^2 e^{-4.8}}{2!} + \frac{(4.8)^3 e^{-4.8}}{3!}$$

$$= 0.00823 + 0.039503 + 0.094807 + 0.15168$$

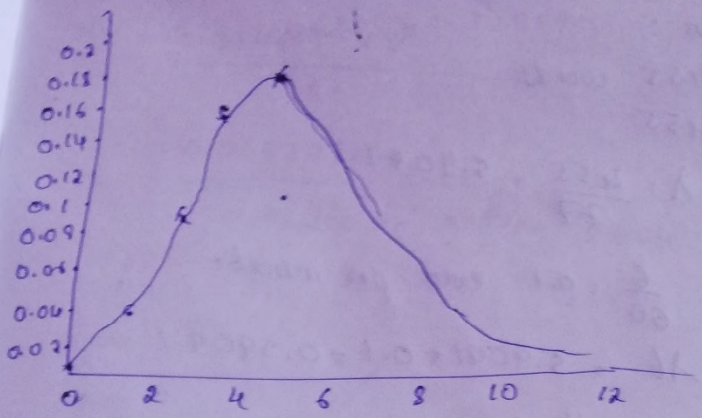
$$= 0.29422$$

c) more than 3 customers

$$P(k > 3) = 1 - P(k \leq 3)$$

$$= 1 - 0.244229916$$

$$= 0.705770084$$


0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2
4
6
8
10
12

For 455 words

$n = 455$

$\lambda = \frac{455}{77} = 5.9091$

$t = \frac{6}{60} = 0.1$ error per minute.

$u = \lambda t = 5.9091 * 0.1 = 0.59091$

$P(x) = \frac{u^x e^{-u}}{x!}$

$P(2) = \frac{(0.59091)^2 e^{-(0.59091)}}{2!}$

$= 0.09669$

For 1000 words

$\lambda = \frac{1000}{77} = 12.987$

$u = \lambda t = 12.987 \times 0.1$

$= 1.2987$

$P(2) = \frac{(1.2987)^2 e^{-1.2987}}{2!}$

$= 0.23012815$

For 255 words.

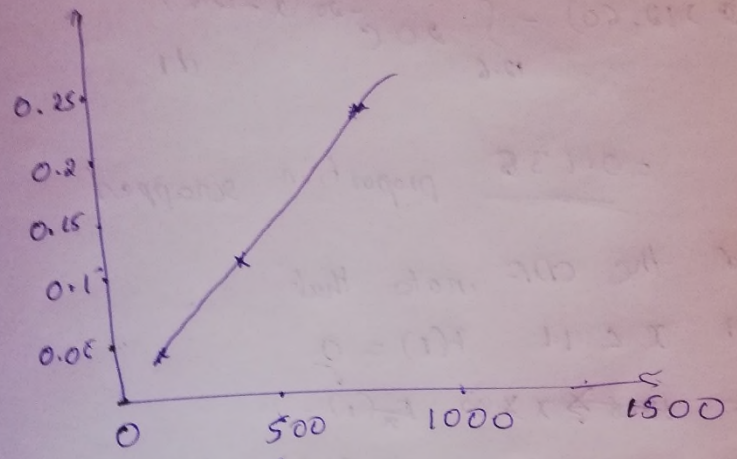
$\lambda = \frac{255}{77} = 3.31169 \quad t = 0.1$

$\lambda t = 3.31169 \times 0.1 = 0.331169$

$$P(2) = \frac{(0.331169)^2 \times e^{-0.331169}}{2!}$$

$$= 0.039377135$$

Probality of getting 2 error



The lamba value depends on the number of words in the report. If the number of words are increasing in the financial report. The lamba value will also increase. This will in turn increase PMF.