EXPONENTIAL

Problem: Customers arrive in a certain shop according to an approximate poisson process at a mean mate of 20 pen hown. What is probabling that shopkeepen will have to wait more than 5 minutes for arrival of customers?

Sol: Let x denote the waiting time in minutes until the first customen arrives and note that $\lambda = \frac{20}{60} = 3$ is expected number of ordival per minutes.

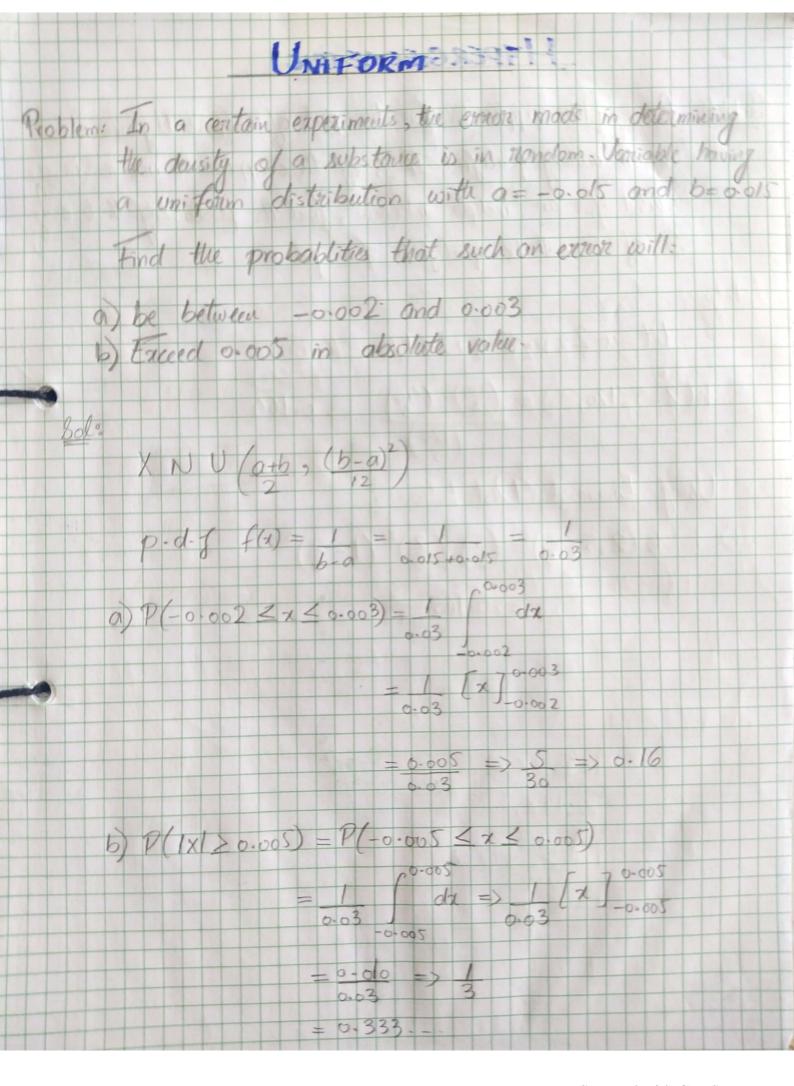
$$\alpha = \frac{1}{3}$$

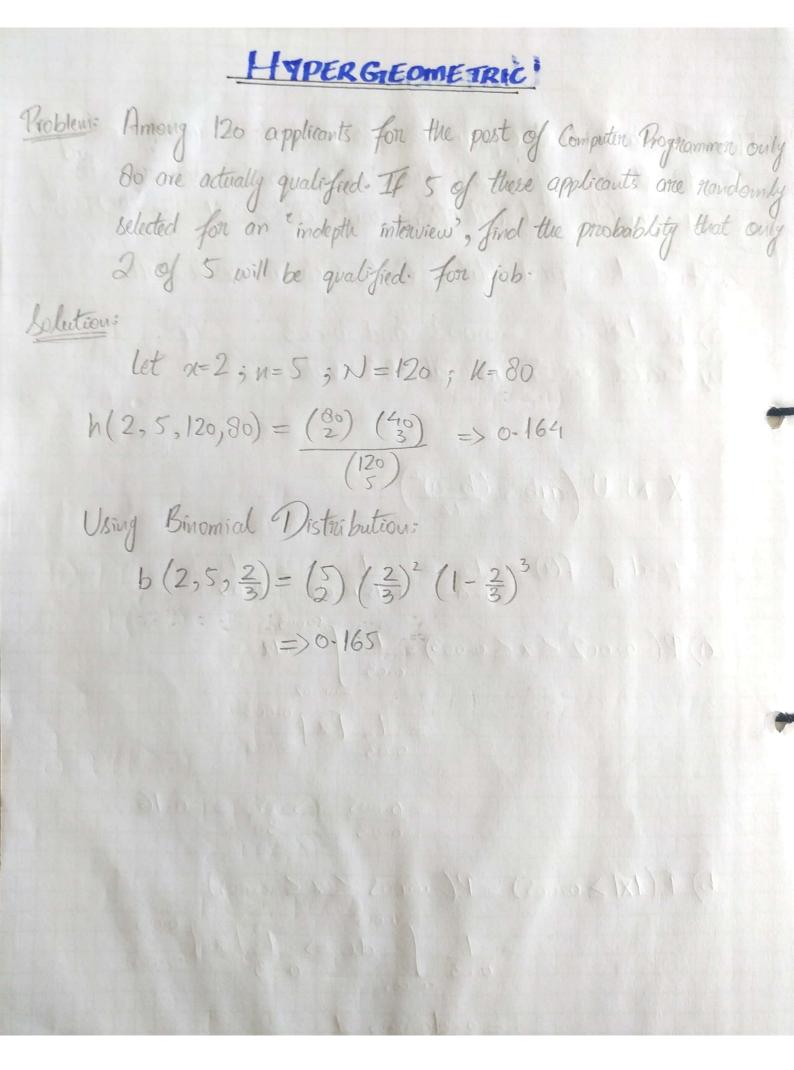
$$P(x > 5) = \int_{5}^{\infty} f(x) dx = \int_{3}^{\infty} \int_{5}^{6-\frac{1}{3}x} dx$$

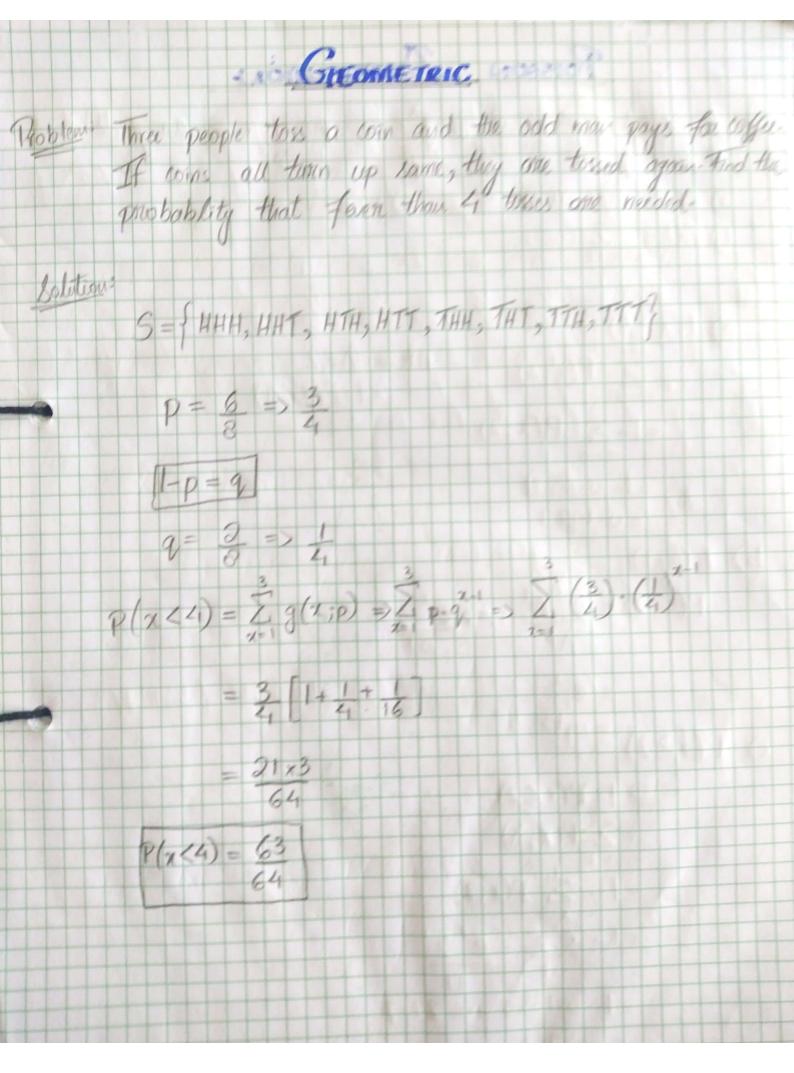
$$=\frac{1}{3}\left\{\frac{e^{-\frac{1}{3}z}}{-\frac{1}{3}}\right\}^{\infty}$$

$$= (e^{-\frac{1}{3}} - 0)$$

$$P(\alpha > 5) = 0.189$$







POISSON DISTRIBUTION

Q. A secretary makes 2 typing envous per page on averge What is probablity that on next page she makes:

Mean: n=2

=1-P(264)

- a) 4 on more errors c) no enous.
- b) Atleast 2 errors

a)
$$P(\alpha \ge 4)$$

= $\sum_{x=4}^{\infty} P(\alpha; 2)$
= $1 - \sum_{x=0}^{\infty} P(\alpha; 2)$
= $1 - 0.8571$
= 0.1429

$$P(0;2) = \frac{e^{-\lambda}\lambda^2}{\lambda!} = \frac{e^{-\lambda}2^{\circ}}{0!}$$

c)
$$P(a \ge 2) = 0.1353$$

$$= \int_{0}^{\infty} P(x < 2)$$

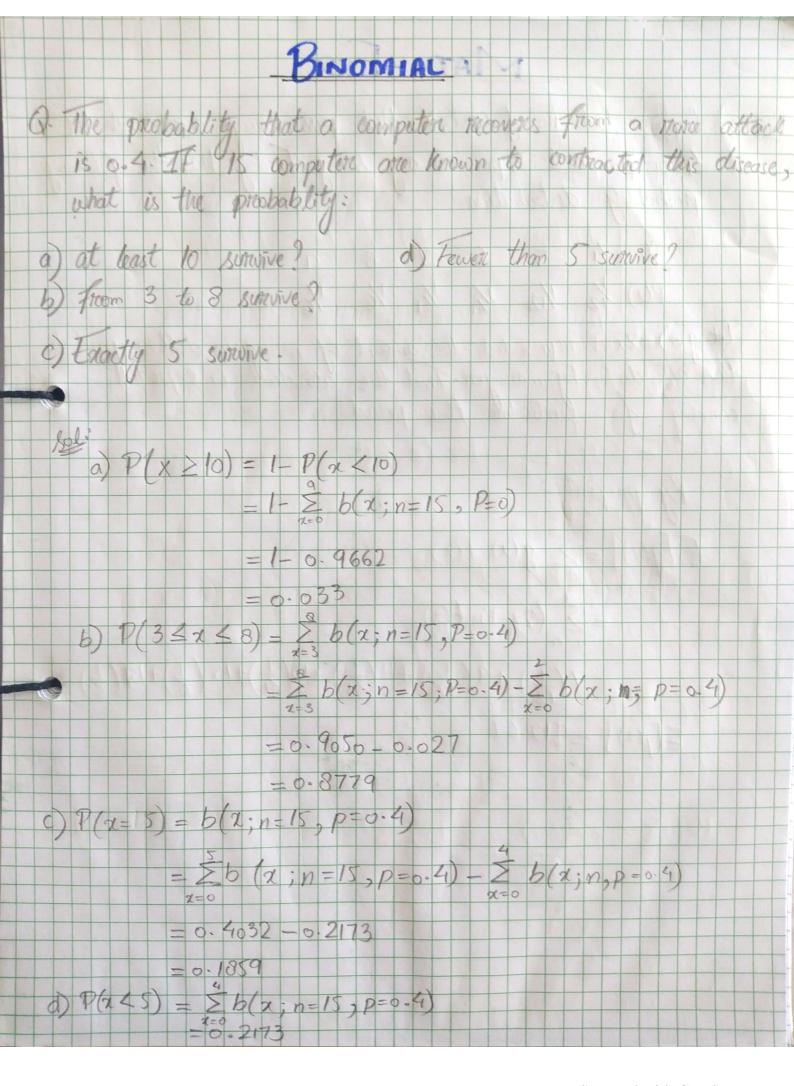
$$= \sum_{x=2}^{\infty} P(x; N)$$

$$= 1 - \sum_{x=0}^{\infty} P(x; 2)$$

$$= 1 - \underbrace{e^{2} 2^{\circ} - e^{2} 2^{\circ}}_{0!}$$

$$= 1 - \underbrace{0.1353}_{0.353} - \underbrace{0.32707}_{0.353}$$

$$= 0.5940$$



MATH-EXP

Problem: Suppose that no. of cans, X, that pass through a con wash between 4:00 pm and 5 pm on any summy Friedry has the following probablity distribution.

X 4 5 6 7 8 9
P(H) 1/2 1/12 1/1 1/4 1/6 1/6

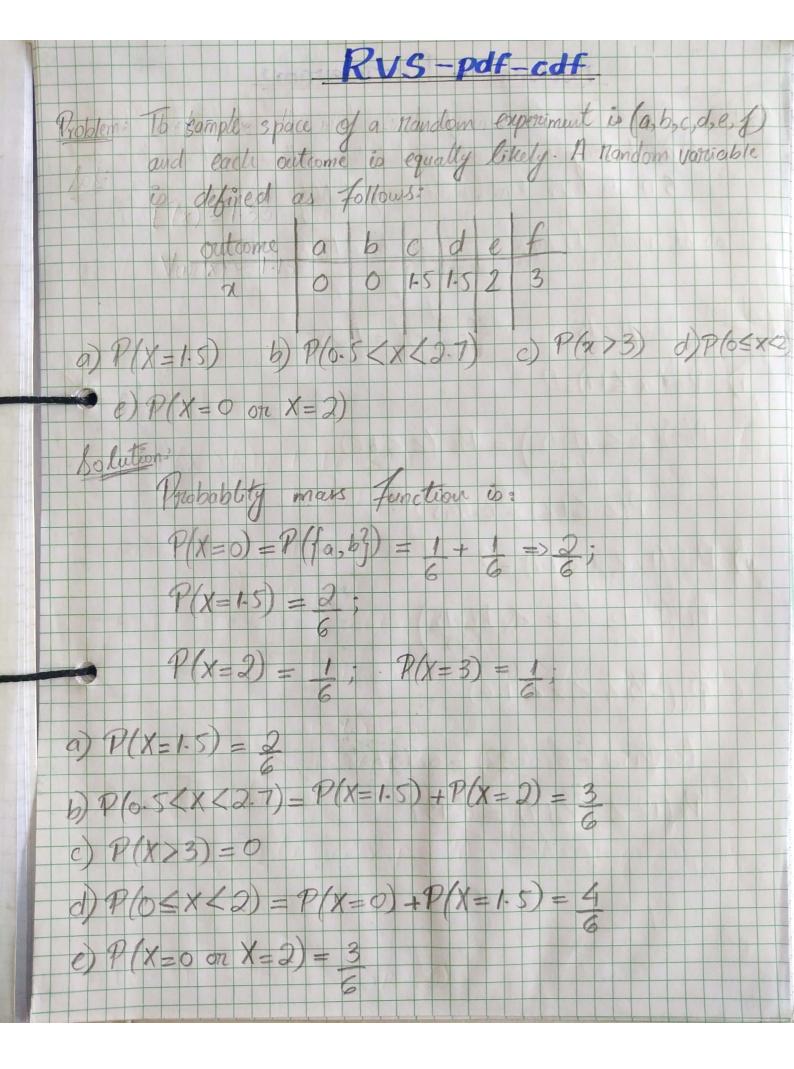
Let g(x)=2x-1 represented the amount of money in dollars, paid to.
the attendent by managen. Find the attendent is expected
earning for particular time period.

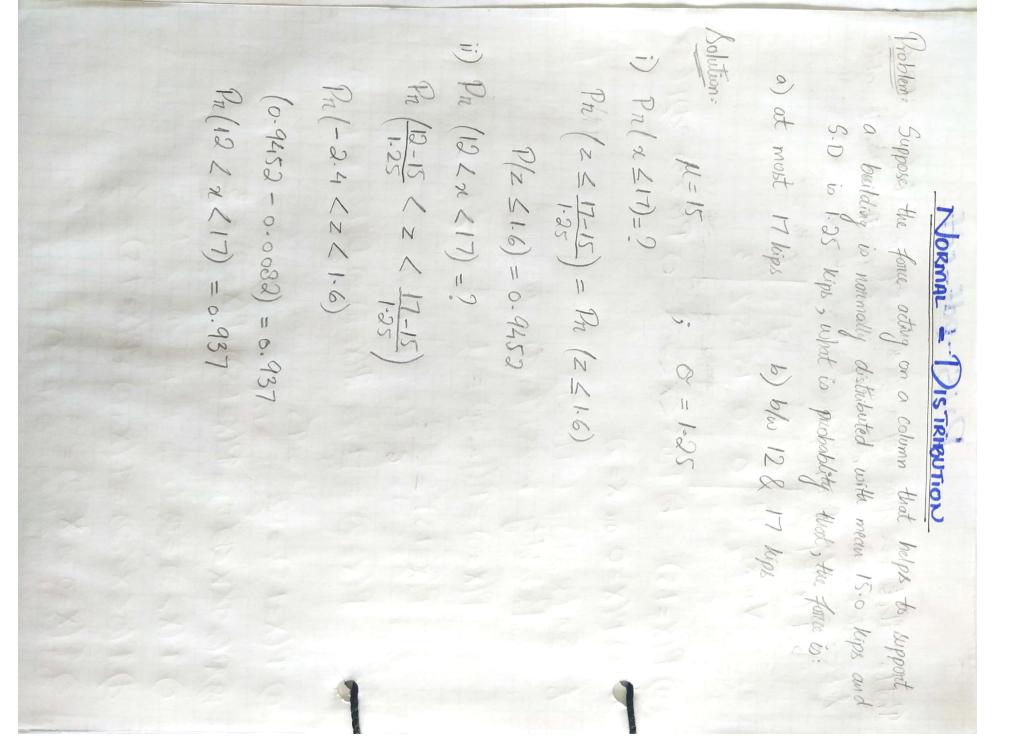
Sol: By property:

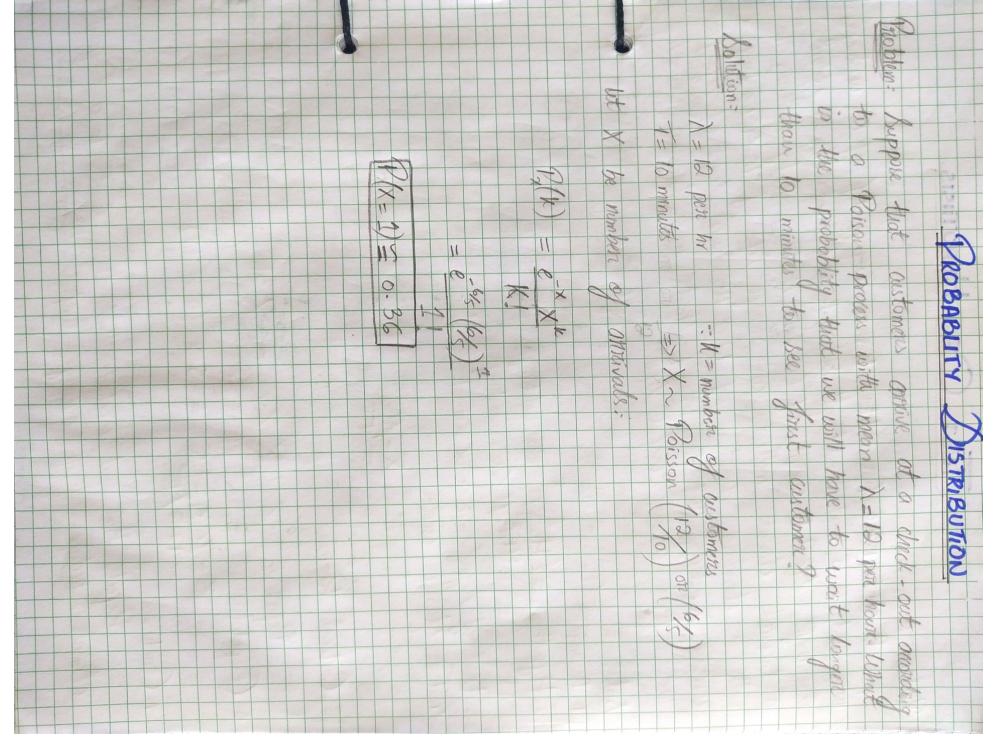
$$\mathbb{E}\left[g(x)\right] = \sum_{\alpha \in \mathcal{A}} g(x) f(x)$$

$$= \sum_{n=4}^{9} (2n-1) f(n)$$

Ason Torn one 21







TEST OF HYPOTHSIS

Problem:

A shirt issued for military has an average life of 85 washings, when used in a moderate climate but will a tropical climate nedwess its useful life? A sample of 60 such shirts worm by soldiers in a tropical climate indicates on average lefe of 76.41 washings, with a standard deviation of 12.8. At 0.01 level of significance can we conclude that the use of shirts in a tropical climate nedwess their average useful life?

Sol:

1- Assumption:

2. Hypothesis => Ho: M=85 washings HA: M <85 washings

3- Level of Significance > 2 = 0.01

4. Test stastic used:

Z = X-Mo.

5 Critical Region:

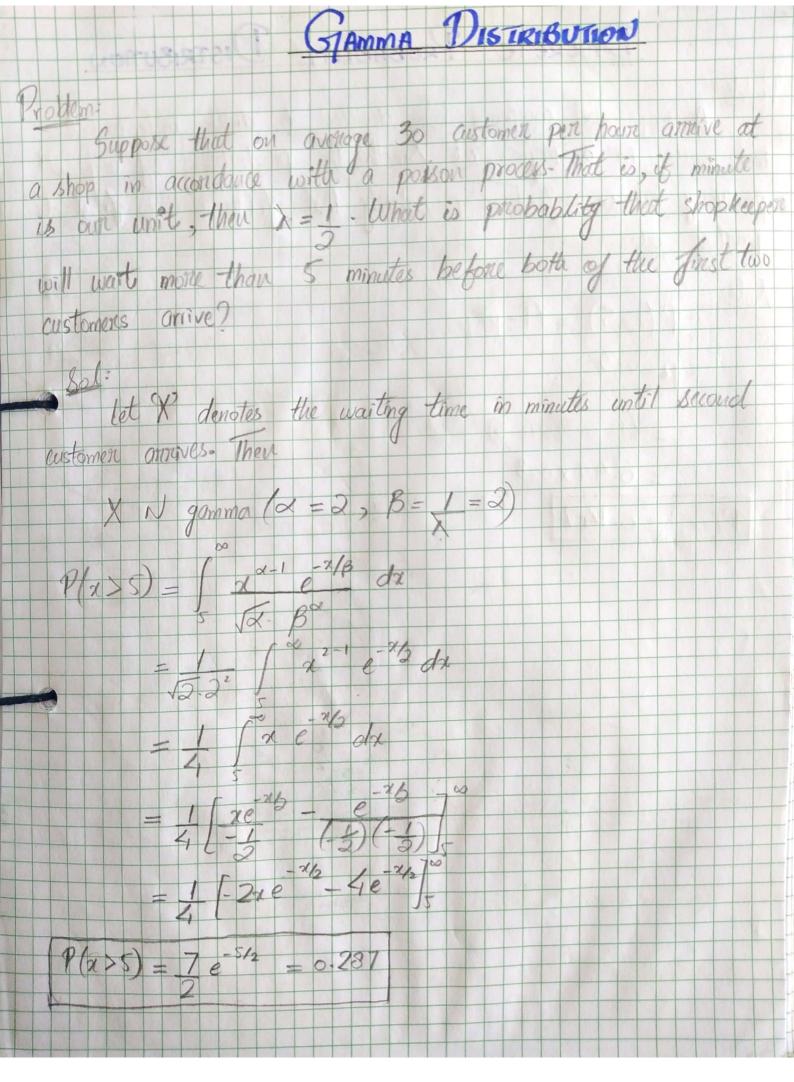
Reject it Zcal L Zd = -2.31

6. Computation:

 $Z = \frac{76-4-85}{12.8/160} = -5.2$

7- Conclusion:

Reject Ho and conclude that those shirts in a tropical climate neduces their average useful life.



DISCRETE PROBABLITY DISTRIBUTION

Froblem:

A major oil company has decided to drill independent test wells in a region at Sinch. The probablity of any well producing oil is 0-3. Find probablity that fifth well is first to produce oil.

$$\int_{0}^{1} \int_{0}^{1} e^{-3x} = (1-p)^{2}p$$

$$= p = 0.3$$

$$= (1-0.3)^{2} \times (0.3)$$

$$= 0.49 \times 0.3$$

$$P(x=5) = 0.147$$

