6

$$E(X) = \sum_{y=0}^{m} \frac{(m+1)!}{y!\,(m-y)!} p^{y+1} (1-p)^{m-y}$$

$$= (m+1)p \sum^{m} \frac{m!}{y!\,(m-y)!} p^{y} (1-p)^{n-y}$$

$$= np \sum_{y=0}^{m} \frac{m!}{y!\,(m-y)!} p^{y} (1-p)^{m-y}$$

the binomial theorm says that.

$$(a+b)^m = \sum_{y=0}^{m} \frac{m!}{y!\,(m-y)} a^y b^{m-y}$$

setting $a = p$ and $b = 1-p$.

$$\sum_{y=0}^{m} \frac{m!}{y!\,(m-y)!} p^{y} (1-p)^{m-y}$$ 2)

$$= \sum_{y=0}^{m} \frac{m!}{y!\,(m-y)!} a^y b^{m-y} = (a+b)^m = (p+1-p)^m = 1$$

$$\boxed{E(X) = np}$$

but $y = x-2$ and $m = n-2$.

$$E(X(X-1)) = \sum_{x=0}^{n} x(x-1) \binom{n}{x} p^x (1-p)^{n-x}$$

$$= \sum_{x=0}^{n} x(x-1) \cdot \frac{n!}{x!\,(n-x)!} p^x (1-p)^{n-x}$$

$$= \sum_{x=2}^{n} \cdot \frac{n!}{(x-2)\,(n-x)} p^x (1-p)^{n-x}$$

$$= n(n-1)p^2 \sum_{x=2}^{n} \cdot \frac{(n-2)!}{(x-2)\,(n-x)!} p^{x-2} (1-p)^{n-x}$$

(8)

$$= 1 - \left[\frac{e^{1.5} 1.5^0}{0!} + \frac{e^{1.5} 1.5^1}{1!} + \frac{e^{1.5} 1.5^2}{2!}\right]$$

$$= 1 - e^{1.5}\left[1 + 1.5 + \frac{2.25}{2}\right]$$

$$\boxed{= 0.1912}.$$

∴ proportion of days on which neither car is used $\approx 0.2231 = 22.31\%$.

And demand is refused $= 0.1912$

$= 19.12\%$.

→ * → * → * →

3) 95

40

84

Q3

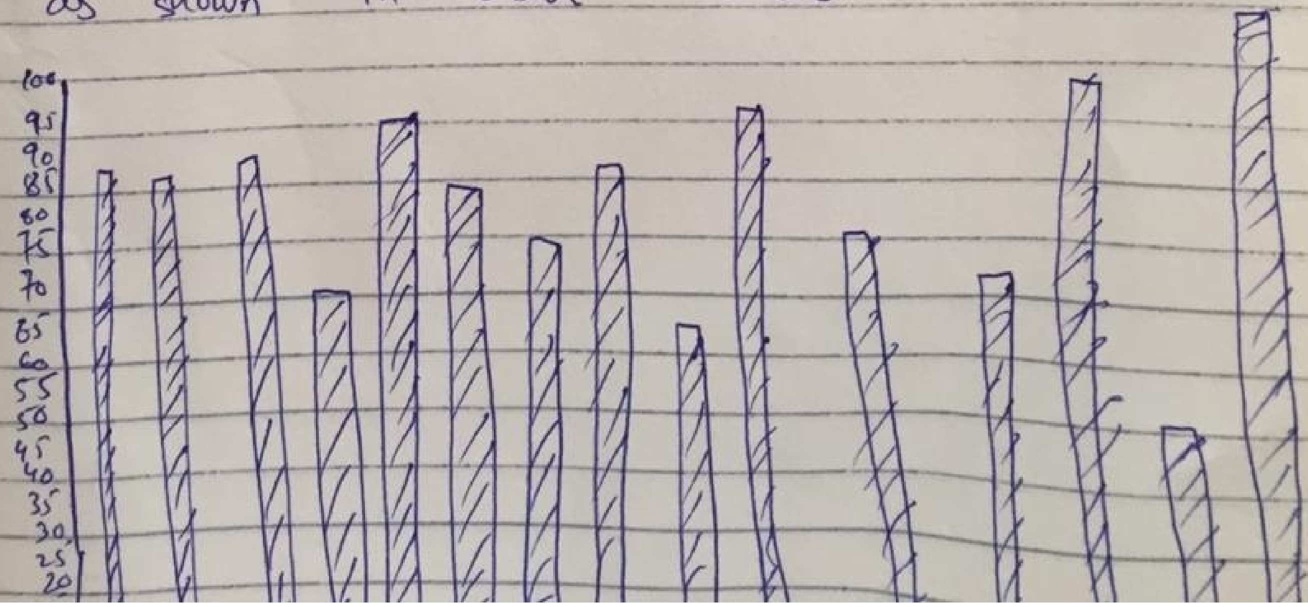
Range (40-93)

Smallest value = 40
largest = 95

for 5 assembles of 15 sub groups
Chart is

Group	Range of defects.	frequency
1	40-50	4
2	51-60	3
3	61-70	2
4	71-80	3
5	81-95	3

The maximum frequency has defects b/w 71-95 - the group 4 and 5 have maximum no of defects respectively as shown in chart above.



Assignable Cause :

Assignable cause is an identifiable spacific cause af variation in a given process ar measurement.

8)

the Traffic intensity a is the product af the arrival rate λ and the mean halding time 'h'. the traffic intensity is a dimensionless quantity.

9) A queuing system is specified completly by the falloeving five basic characteristics.

The input process. It expresses the mode af arrival af coustomers at the service facility governed by some probability law. the numbers af coustomers emanate from finite ar infinate sources.

Q 5)

Randomized Block design:-

with the randomized block design. the experimenter ~~desi~~ divides subject in to sub groups called blocks such that the variablity with in blocks is less than the variability between blocks - this design ensures that each treatment condition has an equal proportion of men and women

6)

Statistical quality control the use of statistical methods in the monitoring and maintaning of the quality of products and services, one method referred to as acceptance sampling can be used when a decision must be made to accept or reject a group of parts or items based on the quality found in a sample

7) Chance cause and assignable causes:-

Chance cause is a process that is operating with only chance causes of variation present is said to be in statistical control - In other words the chance causes are an inherent part of the process.

$$= n(n-1)p^2 \sum_{y=0}^{m} \frac{m!}{y!(m-y)!} p^y (1-p)^{m-y}$$

$$= n(n-1)p^2 (p + (1-p))^m$$

$$= n(n-1)p^2.$$

So the variance of X is

$$E(X^2) - E(X)^2 = E(X(X-1)) + E(X) - E(X)^2$$
$$= n(n-1)p^2 + np - (np)^2$$

$$\Rightarrow \boxed{np(1-p)}$$

* ——— * ——— * ——— * ——— *

2) Let 'x' denate numbers of cars which are hired out per day

for posisson distribution mean 'm' = 1.5

$$P(X = x) = \frac{e^{-m} \cdot m^x}{x!} = \frac{e^{-1.5} \cdot 1.5^x}{x!}$$

ⓒ P (neither car is used)

$$P(X=0) = \frac{e^{-1.5} \cdot 1.5^0}{}$$
$$0.2231$$

a) P(some demand is refused)

$$P(x \geq 2)$$

$$= 1 - P(x \leq 2).$$
$$= 1 - [P(x=0) + P(x=1) + P(x=2)]$$

$\mapsto$

Question No (1)

mean $= np = 4 \longrightarrow (1)$

Variance $= npq = 9 \longrightarrow (2)$

$4q = 9$

$q = 9/4 = 2.25$

$p = 1 - q$

$= 1 - 2.25$ $\boxed{= -1.25}$

$Np = 4$

$\frac{n}{1.25} = 4$

$\boxed{n = -5}$

Binomial distribution.

$P(x = r) = {}^{n}C_{r} p^{r} q^{n-r}$

$= {}^{-5}C_{r} (-1.25)^{r} (2.25)^{-5-r}.$

$P(x \geq 1) = 1 - P(x = 0)$

$\boxed{= 1 - {}^{-5}C_{0} (1.25)(2.25)^{5}}$

2) The critical region defines the set of possible outcomes that would lead to rejection of the hypothesis - these being chosen to have ~~pret~~ predetermined probability called the size of the test. In a simple example the distinction is made between one and two-tailed tests.

3) The 't' distribution has the following properties - the mean of the distribution is equal to 0,
The variance is equal to $V/(v-2)$ where V is the degrees of freedom and $v>2$ - The variance is always greater than 1, although it is close to 1 when there are many degrees of freedom

(4)

1) Analysis of variance is a Statistical method that seperates observed variance data in to different components to use for additional tests.

2) A one way Anova is used for three or more groups of data, to gain information about the relation ship between the dependent and independent variables.

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Question 2

Mean and Variance of Binomial variables. is.

$$b(x; n, p) = \binom{n}{x} p^x (1-p)^{n-x}.$$

this is the probability of having x successes. in a series of n independent trials. When the probability of success in any one of the trials is p.

$$E(X) = \sum_{x=0}^{n} x \binom{n}{x} p^x (1-p)^{n-x}.$$

$$= \sum_{x=0}^{n} x \frac{n!}{x!(n-x)!} p^x (1-p)^{n-x}.$$

$$= \sum_{x=1}^{n} \cdot \frac{n!}{(x-1)!(n-x)!} p^x (1-p)^{n-x}.$$

Since the $x=0$ terms vanishes

let $y = x-1$
and $m = n-1$

subbing $x = y+1$
and $n = m+1$

$x = 1$
& $x = n$

Correspond to $y = 0$
and $y = n-1 = m$, respectively).

as compared to

(1)

Question No 1,

mean $(np) = 4 \rightarrow (1)$

variance $(npq) \rightarrow (2)$

$$Npq / np$$

$$= 3/4$$

we have $p = 1 - q = 1 - 3/4 = 1/4$.

putting values, $p = 1/4$.

$\boxed{\text{we have } n = 16}$

* *