Page(1)

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Program Cs (SE)

Teache Sir David.

Subjet statistic.

Q#

(1) As we know mean (np) = 4 .. (i)
variance (npq) = 3 ... (ii)
Dividing the left hand side and RHS of equation (ii) by equation (i) we have $npq/np = 3/4$

$\Rightarrow q = 3/4$
therefore we have

$p = 1 - q = 1 - 3/4 = 1/4$

Putting the value of $p = 1/4$ in equatio (i) we have $n = 16$.

(C) A critical region also known as the rejection region, is a set of values for the test statistic for which the null hypothesis is rejected. i.e. if the observed test statistic is in the critical region then we reject the null hypothesis and accept the alternative hypothesis.

d). The t distribution has the following properties.

1. The mean of the distribution is equal to 0.
2. The variance is equal to $v/(v-2)$, where v is the degree of the freedom and $v > 2$.

The variance is always greater than 1, although it is close to 1 when there are many degrees of freedom.

(E) Analysis of variance, OR ANOVA, is a statistical method that separate observed variance data into different components to use for additional tests. A one ~~two~~ way ANOVA is used for three or more groups of data, to gain information about the relationship between the dependent and independent variable

(P) RBD:- A diagram that gives the relationship between the components states and ~~[illegible]~~ the success, variance or failure of a specified function. The logical layout in an RBD can be as series system, parallel system or a combination

(g) Statistical quality control:- The use of statistical methods in the monitoring and maintaining of the quality products and services. One method reffered to as acceptance sampling - can be used when a decision must be made to a accept or reject a group of parts or items based on the quality formed in a sample

(H) Chance Cause:- A process that is operating with only one chance can causes of variation present is said to be in statistical control

Assignable Cause is a type of variation in which a specific activity or event can be linked to inconsistancy in a system.

DATE :-

(4)

~~Trafic~~ Trafic intensity :- A measure of the ~~intensity~~ average occupancy of a facility during a specified period of time, normally a busy hour, measured in in traffic units. and defined as the ratio of the time during which a facility is ~~occ~~ occupied to the time this facility is available for occupancy

(5) A queing system is specified completely by using the following five basic characters. The Input process, It expresses the mode of arrival of customers at the service facility governed by some probability law. The number of customers emanate from finite or infinite resources.

DATE :-

(5)

Q2

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

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

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

Since the $x=0$ term vanishes. Let $y = x-1$ and $m = n-1$. Subbing $x = y+1$ and $n = m+1$ into the last sum (and using the fact that the limit $x=1$ and $x=n$ corrospond to $y=0$ and $y = n-1 = m$, respectively

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

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

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

The binomial theorem says that

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

Setting $a = p$ and $b = 1-p$

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

$$= (p+1-p)^{m} = 1.$$

DATE :-

So that

$$E x = np$$

Similarly but this time using $y = x-2$ and

$$m = n-2$$

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

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

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

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

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

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

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

So the variance of x is

$$E(x^2) - E(x)^2 = E(x(x-1)) + E(x) - E(x)^2 =$$

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

DATE :-

[Part B]

Let x denote number of cars hired out per day. poisson distribution mean. m = 1.5

P (x = x) = (((e^-m)(m^x))/(x!)) = ((e^-1.5)(1.5^x))/(x!))

1). P (neither car is used):

P (x = 0) = (e^-1.5)(1.5^0) / 0.2231

2). P (some demand is refused) = P (demand is more than 2 cars per day

P (x > 2)

= 1 - P(x ≤ 2)

= 1 - [P (x = 0) + P(x = 1) + P(x = 2)]

= 1 - [((e^1.5)(1.5^0)/0!) + ((e^1.5)(1.5^1)/1!) + ((e^1.5)(1.5^2)/2!)]

= 1 - e^1.5 [1 + 1.5 + (2.25/2)] = 0.1912 proportion of days on which neither car is used = 0.2231 = 22.31%.

proportion of days on which some demand is refused = 0.1912 = 19.12 %.

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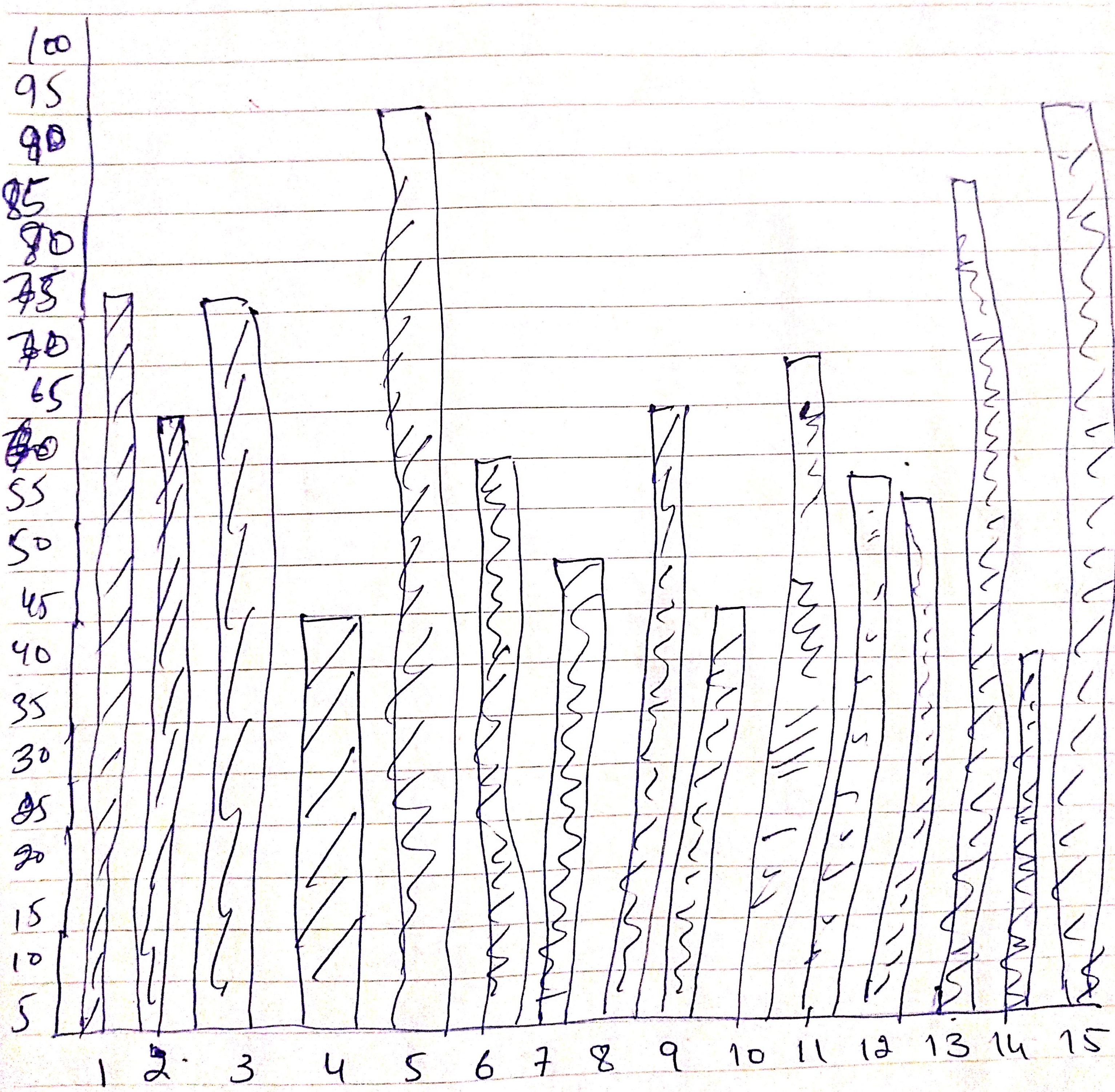
Q1 (3)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