(Assignment no 12)

Ans 1) Application of X^2 distribution

1. Goodness of fit test
2. X^2 test of independence.

Ans 2)

Day	Observed	Expected
Mon	1124	1120
Tue	1125	1120
Wed	1110	1120
Thu	1120	1120
Fri	1126	1120
Sat	1115	1120

Expected value $= \frac{\sum \text{No of parts}}{6}$

$= \frac{6720}{6}$

$= 1120$

H_0 : It follows uniform distribution mean d is independent of day

H_A : It doesn't follow uniform distribute.

$df = k - p - 1$ k = no of samples p = no of Parameter

$= 6 - 0 - 1 = 5$ $= 0$

at 0.05 significance level $X^2_{0.05,5} = 11.070$ critical

$$X^2 = \sum \frac{(O-E)^2}{E} = \frac{(1124-1120)^2}{1120} + \frac{(1125-1120)^2}{1120} \ldots \frac{(1115-1120)^2}{1120}$$

$X^2 = 0.18$

$X^2 < X^2_{critical}$

We will not reject null hypothesis

thus it is independent of day

Date : / /

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Ans 3 $\frac{(n-1)s^2}{\sigma^2} = \chi^2$ 110.25

χ^2 calculated at 49 df (50 − 1)

and

Now at $\frac{(n-1)s^2}{\chi^2_{n-1,\alpha/2}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{n-1,1-\alpha/2}}$

$\frac{49 \times 15^2}{67.5} < \sigma^2 < \frac{49 \times 15^2}{32.36}$ $\chi^2_{49,0.025}$

$\chi^2_{49,0.975}$

$163.33 < \sigma^2 < 340.69$

Now $\sigma^2 = 100$ and it doesn't lie in the interval so we reject the null hypothesis.