ASSIGNMENT-3

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(3) Mean of data $= \frac{1}{5}(77 + 150 + 210 + 125 + 38)$

$= 120.$

For normal distribution, the expected observations are,

$0.15 \times \text{sum} = 0.15 \times 600 = 90.$

$0.24 \times 600 = 144$

$0.38 \times 600 = 228$

$0.18 \times 600 = 108$

$0.05 \times 600 = 30$

Degrees of freedom: $5 - 1 = 4.$

$$\chi^2 = \sum_{i=1}^{5} \frac{\{(\text{expected value})_i - (\text{observed value})_i\}^2}{(\text{expected value})_i}$$

$= 8.358.$

At 5% significance level, $\chi^2_{crit} = 9.488$

At 10% significance level, $\chi^2_{crit} = 7.779$

} for d.o.f = 4.

We see that,

$\chi^2 < \chi^2_{crit}$ at 5% significance level

But, $\chi^2 > \chi^2_{crit}$ at 10% " "

Hence, at 5% significance level, the distribution is normal

At 10% significance level, the distribution is not normal.

(4) Mean of shipment A (μ_A) $= \frac{1}{N_A}\sum(X_A) = 4.708$

N_A = no. of lenses in shipment A

X_A - data in shipment A.

Mean of shipment B (μ_B) $= \frac{1}{N_B}\sum(X_B) = 4.74$

N_B = no. of lenses in shipment B

σ^2 of shipment A (σ_A^2) = 0.01

σ^2 of shipment B (σ_B^2) = 0.006

F - statistics

$$F = \frac{\sigma_A^2}{\sigma_B^2} = 1.848$$

critical value of $F = 2.845$

$F < F_{critical}$ — (1)

T - statistics

Degrees of freedom = $N_A + N_B - 2 = 19 - 2 = 17$.

S^2 (pooled variance of two datasets) $= \frac{(N_A - 1)\sigma_A^2 + (N_B - 1)\sigma_B^2}{N_A + N_B - 2}$

$= \frac{11 \times 0.01 + 6 \times 0.0806}{17}$

$= 0.0086.$

$$T = \frac{M_A - M_B}{\sqrt{S\left(\frac{1}{N_A} + \frac{1}{N_B}\right)}}$$

$= -0.826.$

$T_{critical} = 2.201$

$|T| < T_{crit.}$ — (2)

From ① & ②, we see that the lenses in shipment A and B are from the same population.