

F-test

1. Hyderabad branch:

156, 278, 134, 202, 236, 198, 187, 199, 143, 165, 223

Mumbai branch:

343, 332, 309, 367, 388, 312, 355, 363, 381

i) Variance.

$$\mu_1 = 192.81$$

$$\mu_2 = 350$$

$$\text{Var}_1 = 1665.48 \quad \text{S.D.}_1 = 40.8$$

$$\text{Var}_2 = 709.55 \quad \text{S.D.}_2 = 26.6$$

$$F = \frac{\text{Var}_1}{\text{Var}_2} = \frac{1665.48}{709.55} = 2.347.$$

$$F_{\text{crit}} \text{ at significance } 0.05; \text{ for } v_1 = 10 \text{ and } v_2 = 8 \\ = 3.347 //$$

Since $F_{\text{obs}} < F_{\text{crit}}$. The variance is same for both branches.

2. $H_0 \Rightarrow \mu_1 = \mu_2 = \mu_3 \quad \alpha = 0.05.$

$$df_1 = df_2 = df_3 = 5$$

$$df_1 = n - 1 \quad df_2 = N - k \quad F_{\text{crit}} = 4.677 // \\ = 8 \quad = 18 - 3 \\ = 15.$$

Means;

$$M_1 = 195.83$$

$$N = 18$$

$$M_2 = 175$$

$$\bar{M} = 177.5$$

$$M_3 = 161.6$$

i] Variance within;

$$\Rightarrow \cancel{(210 - 195.83)^2} + \cancel{275}$$

$$\begin{aligned} \Rightarrow & 200.78 + 367.48 + 84.08 + 250.58 + 433.88 \\ & + 33.98 + 225 + 225 + 400 + 225 + 25 \\ & + 400 + 275.56 + 70.56 + 11.56 + 2.56 \\ & + 43.56 + 179.56 \\ & \hline & 15 \end{aligned}$$

$$\Rightarrow 216.94$$

ii] Variance between;

$$\therefore \Rightarrow \frac{(195.83 - 177.5)^2 + (175 - 177.5)^2 + (161.6 - 177.5)^2}{2}$$

$$\Rightarrow \frac{335.98 + 6.25 + 252.81}{2} = 198.34$$

$$\therefore F\text{-value} \Rightarrow \frac{216.94}{198.34} = 1.093$$

$$\therefore F_{\text{crit}}(15, 2) \Rightarrow 19.42$$

0.05

Since within critical range. Hypothesis is valid.

3. Women : $\sigma_{pop} = 30$ $n_w = 7$

$\sigma_{sam} = 35$

Men : $\sigma_{pop} = 50$

$n_m = 12$

$\sigma_{sam} = 45$

$$f\text{-stat} = \frac{\sigma_{sam_1}^2 / \sigma_{pop_1}^2}{\sigma_{sam_2}^2 / \sigma_{pop_2}^2}$$

$$= \frac{35^2 / 30^2}{45^2 / 50^2} = 1.68 //$$

$\therefore v_1 = 6 ; v_2 = 11.$

chosen women above men because $35^2 / 30^2 = 1.36$

and $45^2 / 50^2 = 0.81.$

4. Using the f-statistic calculator with
 $v_1 = 6$ and $v_2 = 11$ and $f = 1.68$

\therefore cum probability $\Rightarrow 0.78.$

5. $\alpha = 0.01$

$$\bar{N} = 31 + 31 + 14 = 76/3 = 25.3$$

$$\text{Variance within} \Rightarrow (2.56)^2 + (3.67)^2 + (2.76)^2$$

$$\Rightarrow 27.6401$$

$$\text{Variance between} \Rightarrow \frac{(25.8 - 25.3)^2 + (22.68 - 25.3)^2 + (21.29 - 25.3)^2}{2}$$

$$\Rightarrow 11.59$$

$$\therefore F\text{-value} \Rightarrow \frac{27.6401}{11.59} = 2.384.$$