

## F-Test [Variance Ratio Test]

- ① The following data shows the no. of bulbs produced daily for some days by 2 workers A and B

A	B
40	39
30	38
38	41
41	33
38	32
35	39
	40
	34

Can we consider based on the data

Worker B is more stable and efficient

$$\alpha = 0.05$$

Ans) ① Null Hypothesis  $H_0: \sigma_1^2 = \sigma_2^2$

Alternate Hypothesis  $H_1: \sigma_1^2 \neq \sigma_2^2$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}$$

② Calculation of Variance

$X_1$	$\bar{x}$	$(x_1 - \bar{x})^2$
40	37	9
30	37	49
38	37	1
41	37	16
38	37	1

$X_2$	$\bar{x}_2$	$(x_2 - \bar{x})^2$
39	37	4
38	37	1
41	37	36
33	37	16
32	37	25
39	37	4
40	37	9

$$\begin{array}{r} 35 \quad 37 \quad 4 \\ \hline \bar{X}_1 = 37 \end{array} \quad \sum (x - \bar{x})^2 = 80$$

$$\begin{array}{r} 34 \quad 37 \quad 9 \\ \hline \bar{X}_2 = 37 \end{array} \quad \sum (x_2 - \bar{x})^2 = 84$$

$$S_1^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}$$

$$S_2^2 = \frac{84}{8-1}$$

$$S_1^2 = \frac{80}{6-1} = \frac{80}{5} = 16$$

$$= \frac{84}{7} = 12$$

→ Calculation of Variance Ratio F-test

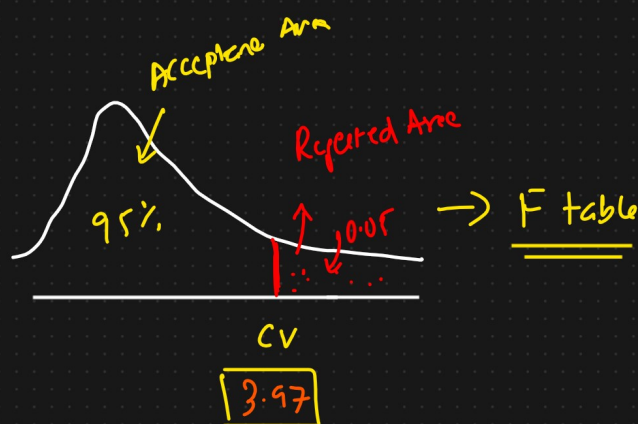
$$F = \frac{S_1^2}{S_2^2} = \frac{16}{12} = 1.33$$

③ Decision Rule

$$df_1 = 6-1 = 5$$

$$df_2 = 8-1 = 7$$

$$\alpha = 0.05$$



If F test is greater than 3.97, Reject the Null Hypothesis

$1.33 < 3.97$ , We fail to Reject the Null Hypothesis

Conclusion

Worker B is not efficient when worked to worker A.