

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 $H_0: \sigma_1^2 = \sigma_2^2$
 $H_1: \sigma_1^2 \neq \sigma_2^2$

② Calculation of Variance

Worker A

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

Worker A

Worker B

X_1	\bar{X}_1	$(X_1 - \bar{X}_1)^2$
40	37	9

X_2	\bar{X}_2	$(X_2 - \bar{X}_2)^2$
39	37	4
38	37	1

30	37	49
38	37	1
41	37	36
38	37	1
35	37	4

$$\bar{X}_1 = 37 \quad \sum (x_i - \bar{x})^2 = 80$$

41	37	16
33	37	16
32	37	25
39	37	4
40	37	9
34	37	9

$$\bar{X}_2 = 37 \quad \sum (x_i - \bar{x})^2 = 84$$

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

$$S_2^2 = \frac{84}{8-1} = \frac{84}{7} = 12$$

Calculation of Variance Ratio Test (F_{Test})

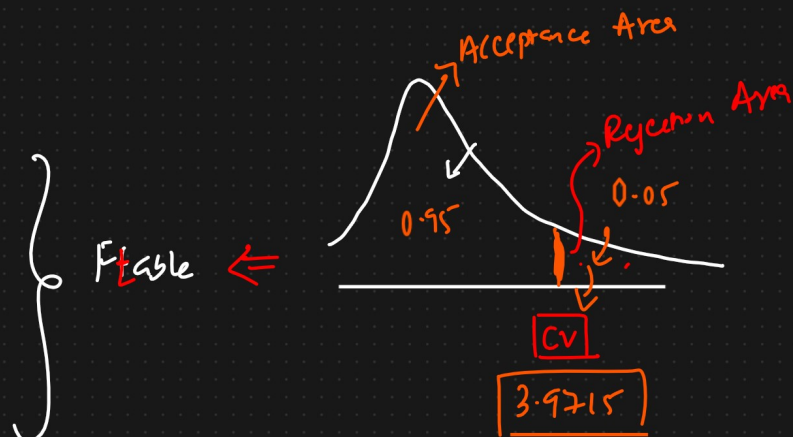
$$F = \frac{S_1^2}{S_2^2} = \frac{16}{12} = 1.33$$

④ Decision Rule

$$df_1 = 6-1 = 5$$

$$df_2 = 8-1 = 7$$

$$\alpha = 0.05$$



Decision

F_{test} is greater than 3.9715, Reject the Null Hypothesis

$1.33 < 3.9715$, we fail to reject the

Null Hypothesis

Conclusion

④ Worker B is not ^{more} stable or efficient when
^
compared to Worker A