A random sample of 10units of mobile phone batteries from manufacturer A gave a lifetime with standard deviation of 5 months while a random sample of 13 units of batteries from manufacturer B gave a lifetime with standard deviation of 4 months. Assume the population to be approximately normal with equal variances. Use a 0.10 level of significance.

Solution

Step 1. State H_o: $\sigma_1^2 = \sigma_2^2$, H_1: $\sigma_1^2 \neq \sigma_2^2 = 0.01$.

Step 2. Type of test - two-tailed test.

Step 3. Level of significance: $\alpha = 0.1$.

Step 4. Critical values: $f\left(\frac{\alpha}{2}, n_1 - 1, n_2 - 1\right) = f(0.05; \ 9; 12) = 3.07$ and $f(0.95; 9; 12) = 2.80$

Step 5. Decision rule: Reject H_o if $\left(\frac{s_1}{s_2}\right)^2 < f\left(1 - \frac{\alpha}{2}, n_1 - 1, n_2 - 1\right)$ or $\left(\frac{s_1}{s_2}\right)^2 > f\left(\frac{\alpha}{2}, n_1 - 1, n_2 - 1\right)$.

Step 6. Compute the statistic:

$$\left(\frac{s_1}{s_2}\right)^2 = \left(\frac{5}{4}\right)^2 = 1.5625.$$

$$\left(\frac{s_1}{s_2}\right)^2 < f(0.95; 9; 12) \ (1.5625 > 2.80).$$

Step 7. Conclusion:

Reject H_o. We have statistical evidence at a 10% level of significance to believe that the true variances are not equal each other.