12.7: Formula Review

12.2 Test of Two Variances

$$\begin{aligned} H_0 &: \frac{\sigma_1^2}{\sigma_2^2} = \delta_0 \\ H_a &: \frac{\sigma_1^2}{\sigma_2^2} \neq \delta_0 \end{aligned} \tag{12.7.1}$$

if $\delta_0 = 1$ then

$$\begin{aligned} H_0 &: \sigma_1^2 = \sigma_2^2 \\ H_a &: \sigma_1^2 \neq \sigma_2 \end{aligned} \tag{12.7.2}$$

Test statistic is :

$$F_c = \frac{S_1^2}{S_2^2} \tag{12.7.3}$$

12.3 The F Distribution and the F-Ratio

$$\begin{aligned} SS_{\text{between}} &= \sum \left[\frac{(s_j)^2}{n_j} \right] - \frac{\left(\sum s_j\right)^2}{n} \\ SS_{\text{total}} &= \sum x^2 - \frac{\left(\sum x\right)^2}{n} \\ SS_{\text{within}} &= SS_{\text{total}} - SS_{\text{between}} \\ df_{\text{between}} &= df(\text{ num }) = k - 1 \\ df_{\text{within}} &= df(denom) = n - k \\ MS_{\text{between}} &= \frac{SS_{\text{between}}}{df_{\text{between}}} \\ MS_{\text{within}} &= \frac{SS_{\text{within}}}{df_{\text{within}}} \\ F &= \frac{MS_{\text{between}}}{MS_{\text{within}}} \end{aligned}$$

- $k =$ the number of groups
- $n_j =$ the size of the j th group
- $s_j =$ the sum of the values in the j^{th} group
- $n =$ the total number of all values (observations) combined
- $x =$ one value (one observation) from the data
- $s_{\bar{x}}^2 =$ the variance of the sample means
- ${s^2}_{\text{pooled}} =$ the mean of the sample variances (pooled variance)