VISUAL SUMMARY

One-Way Analysis of Variance—Computational Formulas

Before You Begin: State H_0 and H_1 .

Compute ΣX for each sample, ΣX^2 for each sample, n for each sample, and N_{total} .

Compute sums of squares:

$$SS_{bg}$$

 SS_{wg}

$$SS_{\text{bg}} = \left[\frac{(\sum X_1)^2 + (\sum X_2)^2 + \dots + (\sum X_k)^2}{n_1} \right] - \left[\frac{(\sum X_1 + \sum X_2 + \dots + \sum X_k)^2}{N_{\text{total}}} \right]$$

$$SS_{\text{wg}} = \left[\sum X_1^2 + \sum X_2^2 + \dots + \sum X_k^2 \right] - \left[\frac{(\sum X_1)^2}{n_1} + \frac{(\sum X_2)^2}{n_2} + \dots + \frac{(\sum X_k)^2}{n_k} \right]$$

Compute degrees of freedom between:

$$df_{\text{bg}} = k - 1$$

Compute degrees of freedom within:

$$df_{\text{wg}} = (n_1 - 1) + (n_2 - 1) + \dots + (n_k - 1)$$

Compute mean square between:

$$MS_{\text{bg}} = \frac{SS_{\text{bg}}}{df_{\text{bg}}}$$

Compute mean square within:

$$MS_{\rm wg} = \frac{SS_{\rm wg}}{df_{\rm wg}}$$

Compute F ratio

$$F = \frac{MS_{\text{bg}}}{MS_{\text{wg}}}$$