Chapter 12 Review

Section 9-3 introduced methods for testing a claim that two independent samples are from populations with the same mean. If we have samples from more than two populations, we should not use the methods from Section 9-3 because the use of multiple tests creates big problems for the level of significance being used. Instead, we use the methods of analysis of variance when testing a claim that three or more different samples are from populations having the same mean.

One-Way Analysis of Variance Section 12-2 presents the method of one-way analysis of variance, which is a method used to test for equality of three or more population means. (The requirements and procedure are listed in Section 12-2.) Because of the complex nature of the required calculations, we focus on the interpretation of *P*-values obtained using technology. When using one-way analysis of variance for testing equality of three or more population means, we use this decision criterion:

- **Reject:** If the *P*-value is small (such as 0.05 or less), reject the null hypothesis of equal population means and conclude that at least one of the population means is different from the others.

- **Fail to Reject:** If the *P*-value is large (such as greater than 0.05), fail to reject the null hypothesis of equal population means. Conclude that there is not sufficient evidence to warrant rejection of equal population means.

Two-Way Analysis of Variance Section 12-3 presents the method of two-way analysis of variance, which is used with data categorized according to two different factors. One factor is used to arrange the sample data in different rows, while the other factor is used to arrange the sample data in different columns. The procedure for two-way analysis of variance is summarized here:

1. Interaction Test for an interaction between the two factors.

- If the *P*-value for the interaction is small (such as 0.05 or less), there appears to be an interaction effect, and we should stop here and not proceed with the following two tests.

- If the *P*-value is large (such as greater than 0.05), there does not appear to be an interaction effect, and we should proceed with the following two tests.

2. Row Factor Test for an effect from the factor used to arrange the sample data in different rows.

- If the *P*-value for the row factor is small (such as 0.05 or less), there appears to be an effect from the row factor.

- If the *P*-value for the row factor is large (such as greater than 0.05), there does not appear to be an effect from the row factor.

3. Column Factor Test for an effect from the factor used to arrange the sample data in different columns.

- If the *P*-value for the column factor is small (such as 0.05 or less), there appears to be an effect from the column factor.

- If the *P*-value for the column factor is large (such as greater than 0.05), there does not appear to be an effect from the column factor.

In Section 12-3 we also considered the use of two-way analysis of variance for the special case in which there is only one observation per cell.