## 9-3 Basic Skills and Concepts

### Statistical Literacy and Critical Thinking

**1. Independent and Dependent Samples** Which of the following involve independent samples?

**a.** To test the effectiveness of the Atkins diet, 36 randomly selected subjects are weighed before the diet and six months after treatment with the diet. The two samples consist of the before/after weights.

**b.** To determine whether smoking affects memory, 50 randomly selected smokers are given a test of word recall and 50 randomly selected nonsmokers are given the same test. Sample data consist of the scores from the two groups.

**c.** IQ scores are obtained from a random sample of 75 wives and IQ scores are obtained from their husbands.

**d.** Annual incomes are obtained from a random sample of 1200 residents of Alaska and from another random sample of 1200 residents of Hawaii.

**e.** Scores from a standard test of mathematical reasoning are obtained from a random sample of statistics students and another random sample of sociology students.

**2. Interpreting Confidence Intervals** If the heights of men and women from Data Set 1 in Appendix B are used to construct a 95% confidence interval for the difference between the two population means, the result is $11.61 \text{ cm} < \mu_1 - \mu_2 < 17.32 \text{ cm}$, where heights of men correspond to population 1 and heights of women correspond to population 2. Express the confidence interval with heights of women being population 1 and heights of men being population 2.

**3. Interpreting Confidence Intervals** What does the confidence interval in Exercise 2 suggest about the heights of men and women?

**4. Hypothesis Tests and Confidence Intervals**

**a.** In general, if you conduct a hypothesis test using the methods of Part 1 of this section, will the *P*-value method, the critical value method, and the confidence interval method result in the same conclusion?

**b.** Assume that you want to use a 0.05 significance level to test the claim that the mean height of men is greater than the mean height of women. What *confidence level* should be used if you want to test that claim using a confidence interval?

***In Exercises 5–20, assume that the two samples are independent simple random samples selected from normally distributed populations, and do not assume that the population standard deviations are equal. Do the following:***

**a.** ***Test the given claim using the P-value method or critical value method.***

**b.** ***Construct a confidence interval suitable for testing the given claim.***

**5. Color and Creativity** Repeat Example 2 with these changes: Use a 0.05 significance level, and test the claim that the two samples are from populations with the same mean.

**6. Color and Cognition** In the Chapter Problem, it was noted that researchers conducted a study to investigate the effects of color on cognitive tasks. Words were displayed on a computer screen with background colors of red and blue. Results from scores on a test of word recall are given below. Use a 0.05 significance level to test the claim that the samples are from populations with the same mean. Does the background color appear to have an effect