2. A sample of 20 items provides a sample standard deviation of 5.
   a. Compute the 90% confidence interval estimate of the population variance.
   b. Compute the 95% confidence interval estimate of the population variance.
   c. Compute the 95% confidence interval estimate of the population standard deviation.

3. A sample of 16 items provides a sample standard deviation of 9.5. Test the following hypotheses using $\alpha = .05$. What is your conclusion? Use both the p-value approach and the critical value approach.

$$H_0\colon \sigma^2 \leq 50$$
$$H_a\colon \sigma^2 > 50$$

10. **Costco Customer Satisfaction.** *Consumer Reports* uses a 100-point customer satisfaction score to rate the nation's major chain stores. Assume that from past experience with the satisfaction rating score, a population standard deviation of $\sigma = 12$ is expected. In 2012, Costco, with its 432 warehouses in 40 states, was the only chain store to earn an outstanding rating for overall quality. A sample of 15 Costco customer satisfaction scores follows.

95	90	83	75	95
98	80	83	82	93
86	80	94	64	62

   a. What is the sample mean customer satisfaction score for Costco?
   b. What is the sample variance?
   c. What is the sample standard deviation?
   d. Construct a hypothesis test to determine whether the population standard deviation of $\sigma = 12$ should be rejected for Costco. With a .05 level of significance, what is your conclusion?

13. Find the following F distribution values from Table 4 of Appendix B.
   a. $F_{.05}$ with degrees of freedom 5 and 10
   b. $F_{.025}$ with degrees of freedom 20 and 15
   c. $F_{.01}$ with degrees of freedom 8 and 12
   d. $F_{.10}$ with degrees of freedom 10 and 20

15. Consider the following hypothesis test.

$$H_0\colon \sigma_1^2 = \sigma_2^2$$
$$H_a\colon \sigma_1^2 \neq \sigma_2^2$$

a. What is your conclusion if $n_1 = 21$, $s_1^2 = 8.2$, $n_2 = 26$, and $s_2^2 = 4.0$? Use $\alpha = .05$ and the p-value approach.
b. Repeat the test using the critical value approach.

22. **Stopping Distances of Automobiles.** A research hypothesis is that the variance of stopping distances of automobiles on wet pavement is substantially greater than the variance of stopping distances of automobiles on dry pavement. In the research study, 16 automobiles traveling at the same speeds are tested for stopping distances on wet pavement and then tested for stopping distances on dry pavement. On wet pavement, the standard deviation of stopping distances is 9.76 meters. On dry pavement, the standard deviation is 4.88 meters.
a. At a .05 level of significance, do the sample data justify the conclusion that the variance in stopping distances on wet pavement is greater than the variance in stopping distances on dry pavement? What is the p-value?
b. What are the implications of your statistical conclusions in terms of driving safety recommendations?