

Section 8-4

Testing a Claim about a Standard Deviation or Variance

ASSUMPTIONS FOR TESTING A CLAIM ABOUT σ OR σ^2

1. The sample is a simple random sample.
2. The population has values that are normally distributed. This is a strict requirement.

CHI-SQUARE DISTRIBUTION

Test Statistic: $\chi^2 = \frac{(n - 1)s^2}{\sigma^2}$

n = sample size

s^2 = **sample** variance

σ^2 = **population** variance

P-VALUES AND CRITICAL VALUES FOR CHI-SQUARE DISTRIBUTION

- Use Table A-4.
- The degrees of freedom (df) = $n - 1$

PROPERTIES OF CHI-SQUARE DISTRIBUTION

1. All values of χ^2 are nonnegative, and the distribution is not symmetric.
2. There is a different distribution for each number of degrees of freedom.
3. The critical values are found in Table A-4 using $n-1$ degrees of freedom.

CRITICAL VALUES

Suppose the significance level is $\alpha = 0.05$.

Right-tailed test: Because the area to the *right* of the critical value is 0.05, locate 0.05 at the top of Table A-4.

Left-tailed test: With a left tailed area of 0.05, the area to the *right* of the critical value is 0.95, so locate 0.95 at the top of Table A-4.

Two-tailed test: Divide the significance level of 0.05 between the left and right tails, so that the areas to the *right* of the two critical values are 0.975 and 0.025, respectively. Locate 0.975 and 0.025 at the top of Table A-4.
