This procedure also is best seen via an example. Suppose we have the null hypothesis
\( H_0: \sigma^2 = 4 \) and suppose we have the sample \{1, 2, 3, 4, 5\}. The procedure is as follows:

1. State the null hypothesis, the alternative hypothesis, and the significance level:
   - \( H_0: \sigma^2 = 4 \)
   - \( H_A: \sigma^2 \neq 4 \)
   - \( \alpha = .05 \)

2. Determine the critical region
   We follow the same logic used in the previous section. We are willing to wrong with probability .05, and we can be wrong in either of two ways. With probability .025 we will be wrong vis-à-vis \( \sigma^2 > 4 \) if \( u > \chi^2_{1-\alpha/2} \), and with probability .025 we will be wrong vis-à-vis \( \sigma^2 < 4 \) if \( u < \chi^2_{\alpha/2} \). From Table A.4 or Excel’s CHIINV function, we have \( \chi^2_{1-\alpha/2} = 11.143 \) and \( \chi^2_{\alpha/2} = 0.484 \).

Thus, the critical region is \{\( u \mid u < -2.776 \}\} \cup \{\( u \mid u > 2.776 \}\}. Graphically, the critical region is as follows:
(3) Determine the value of the test statistic

The sample \( \{1, 2, 3, 4, 5\} \) yields

\[ n = 5 \]

and

\[ s_1^2 = \frac{(1 - 3)^2 + (2 - 3)^2 + (3 - 3)^2 + (4 - 3)^2 + (5 - 3)^2}{5 - 1} = \frac{10}{4} = 2.5, \]

so the value of the test statistic is

\[ u^* = \frac{(n-1)s^2}{\sigma_0^2} = \frac{(5-1)2.5}{4} = 2.5 \]

(4) Locate the value of the test statistics relative to the critical region

Since \( 0.484 < 2.5 < 11.143 \), \( u^* \) is not in the critical region.

Graphically, we have the following:

![Graph showing test statistics]

(5) Make the decision

Since \( u^* \) is not in the critical region, we maintain the null hypothesis \( H_0: \sigma^2 = 4 \).

PROBLEM:
Suppose we have the sample \( \{1, 2, 3, 4, 5\} \). Test the following hypotheses

\[ H_0 : \sigma^2 = 1 \]
\[ H_A : \sigma^2 > 1 \]
\[ \alpha = .01 \]