

Hypothesis Tests involving a claim about the true value of the **Population Standard Deviation** σ_x

Step 1: Take a random sample of size n from a **normal population**.

Use a calculator to input the sample values and find the **sample standard deviation** s_x .

Step 2: State H_0 as an **equality** and H_1 as the alternate **inequality**.

Step 3: Decide the appropriate critical region(s) (One Tail Left, One Tail Right or Two Tail Left and Right) based on the significance level α

If H_1 is a **less than** statement like

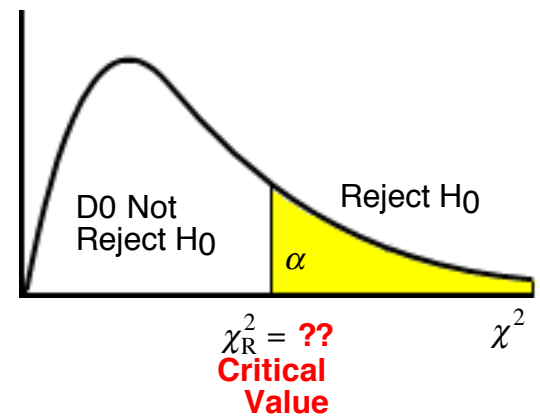
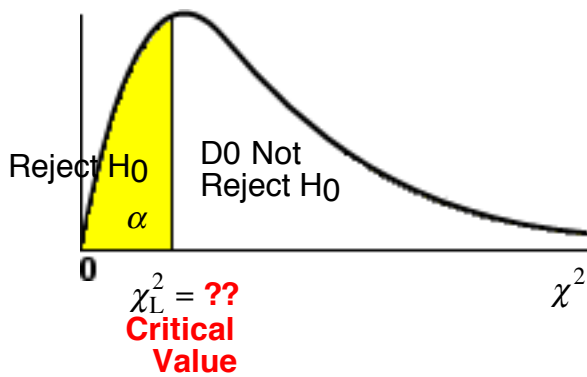
$$H_1 \sigma_x < 2.7$$

then the rejection region is in the **left tail**

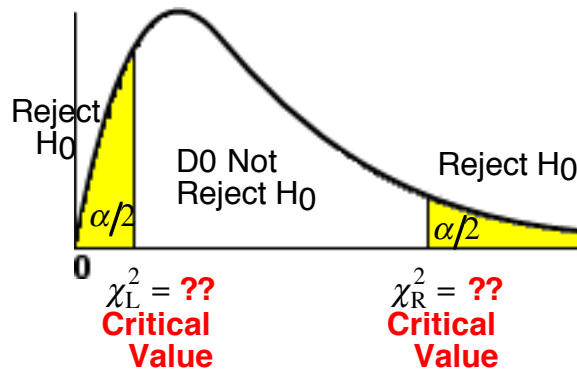
If H_1 is a **greater than** statement like

$$H_1 \sigma_x > 2.7$$

then the rejection region is in the **right tail**



If H_1 is a **not equal** statement like $H_1 \sigma_x \neq 2.7$ then the rejection regions are in the **left and right tails**



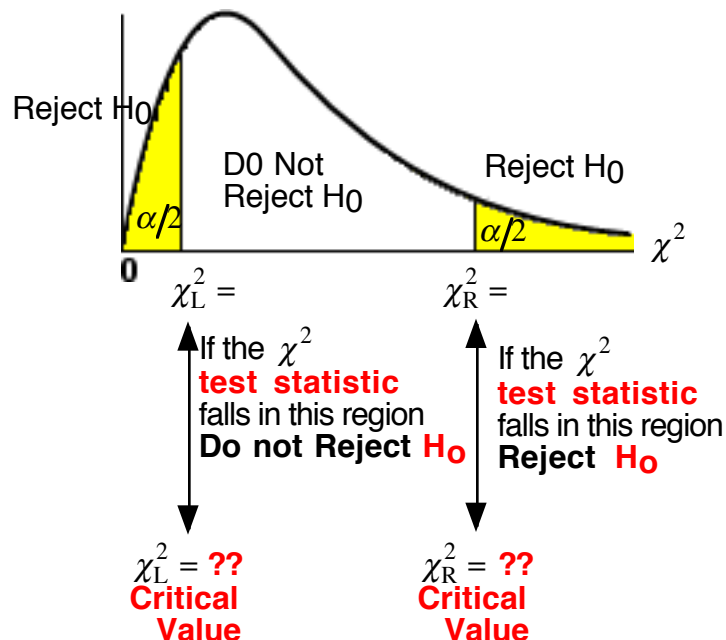
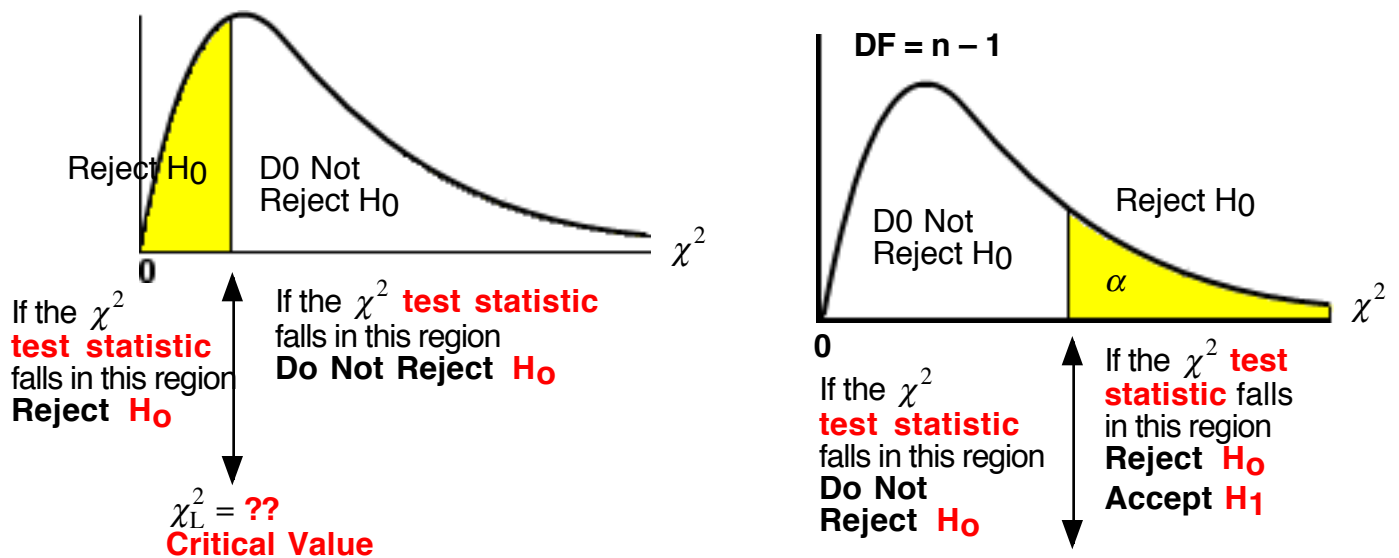
Step 4: **The χ^2 distribution is used to test claims about the population standard deviation.**

Graph the χ^2 curve. Compute the critical χ^2 values using a χ^2 table and the correct degrees of freedom and place them on the graph. Label the Reject and Do not Reject regions.

Step 5: Compute the value of the the χ^2 **test statistic** using the values stated in H_0 and H_1 .

The χ^2 **Test Statistic** for the **Population Standard Deviation** is: $\chi^2 = \frac{(n-1)s_x^2}{\sigma^2}$

Step 6: Decide if the test statistic falls into the Reject or DNR region. If the test statistic falls in the Rejection Region than the difference between the claimed value in H_0 and the sample value is significantly large enough to reject the H_0 claim of equality



State a conclusion based on H_0 : Either Reject H_0 or Do Not Reject H_0

Conclusion based on the problem:

Reject H_0

There is sufficient evidence at the α level to **support the claim** of “inequality” in H_1

Do Not Reject H_0

There is **not sufficient** evidence at the α level to reject the “statement of equality in H_0 ”

or

There is not sufficient evidence at the α level to support the “statement of inequality in H_1 ”