ECON 203 CHEAT SHEET

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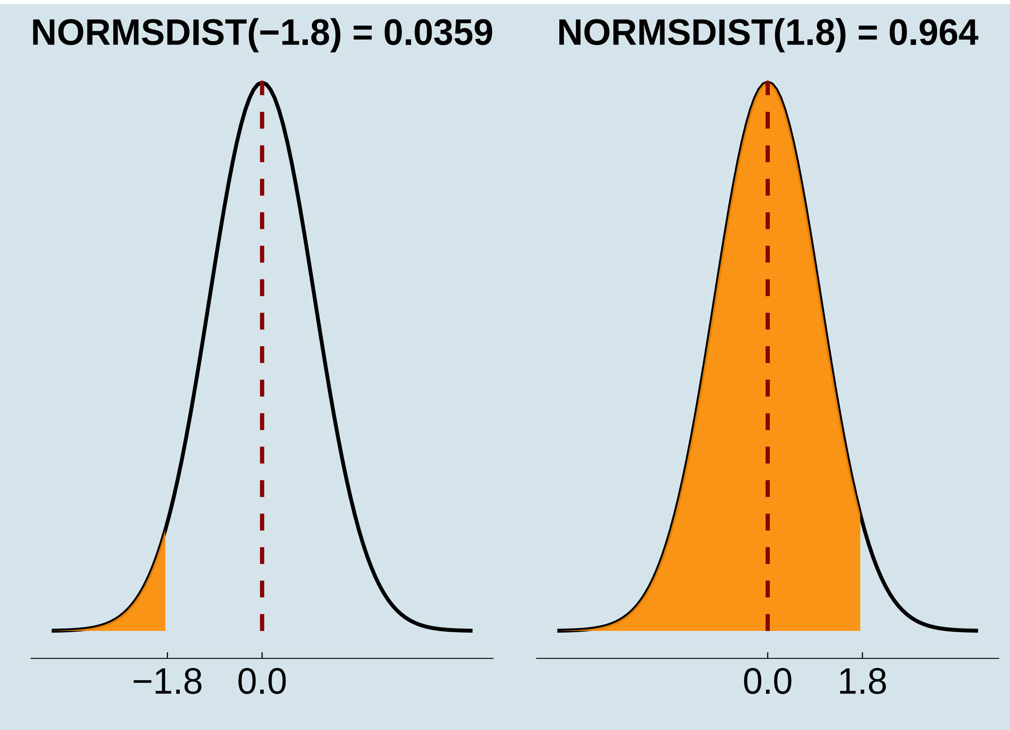
STANDARD NORMAL

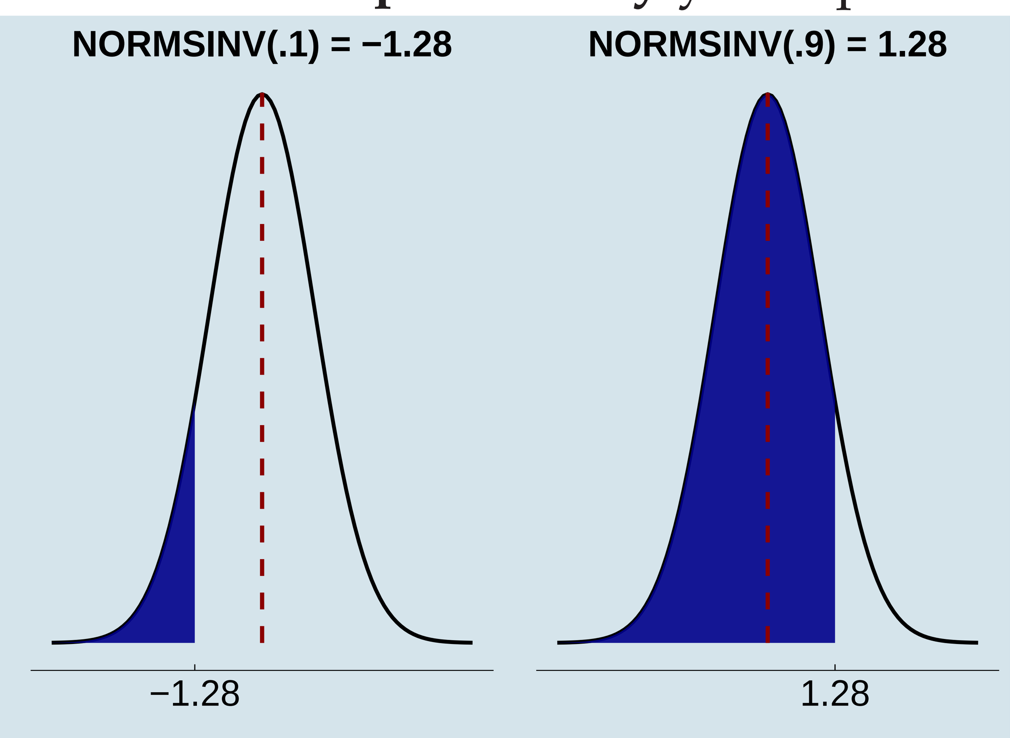
- The center is zero
- Symmetric
- bell-shaped
- NORMSDIST for pvalues

  NORMSDIST returns the **left-tail probability** of the standard normal distribution based on your test statistic.



- NORMSINV for critical values

  NORMSINV returns the critical value of the standard normal distribution based on the **left-tail probability** you input.



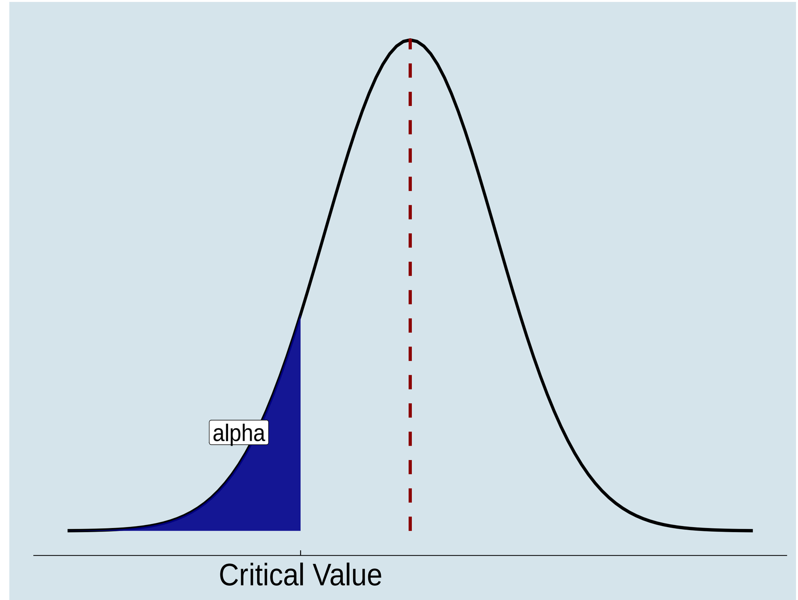
HYPOTHESIS TESTING

Using NORMSDIST and NORMSINV

Alternative Hypothesis | **Where is the pvalue?** | **How to get the pvalue?** | **Where is the rejection region?** | **How to get Z_c?**

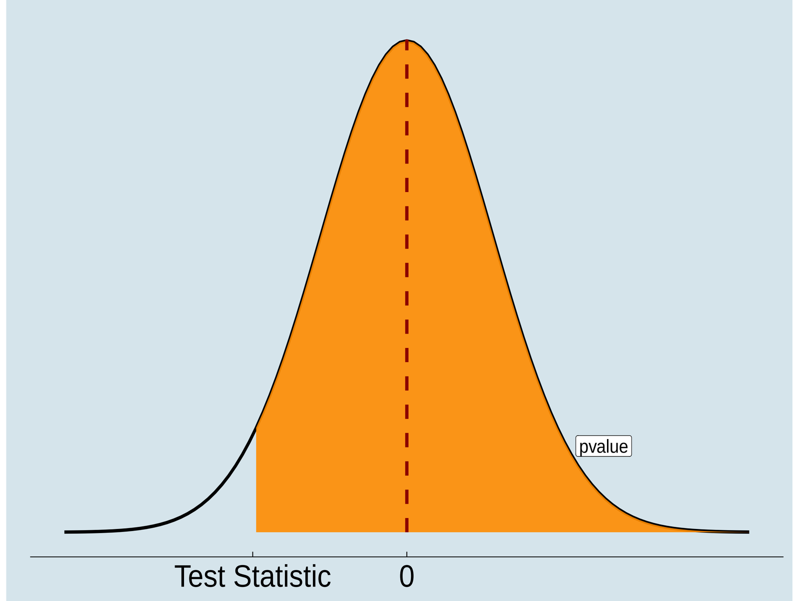
$H_a : \mu < ...$

You want the area to the **left** of your test statistic. Therefore, use NORMSDIST(z).

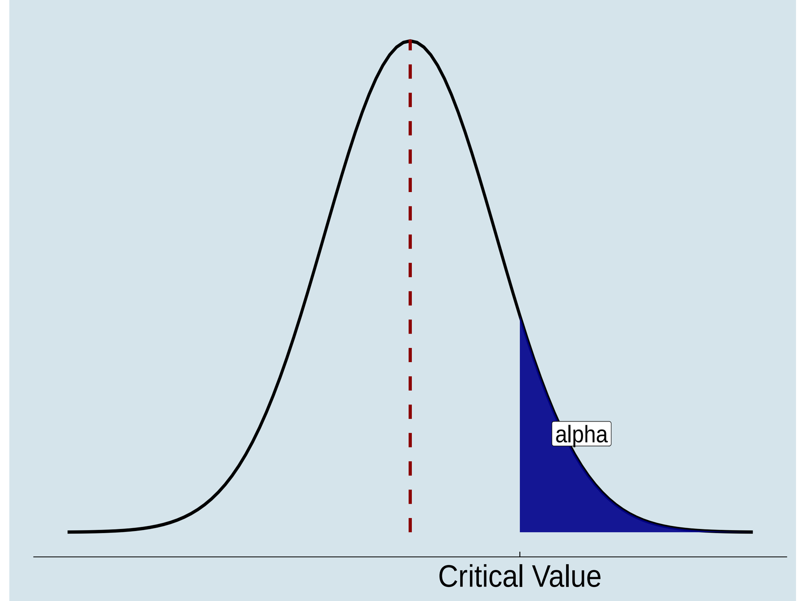


Critical Value = NORMSINV(α)

$H_a : \mu > ...$



You want the area to the **right** of your test statistic. Therefore, use 1-NORMSDIST(z).

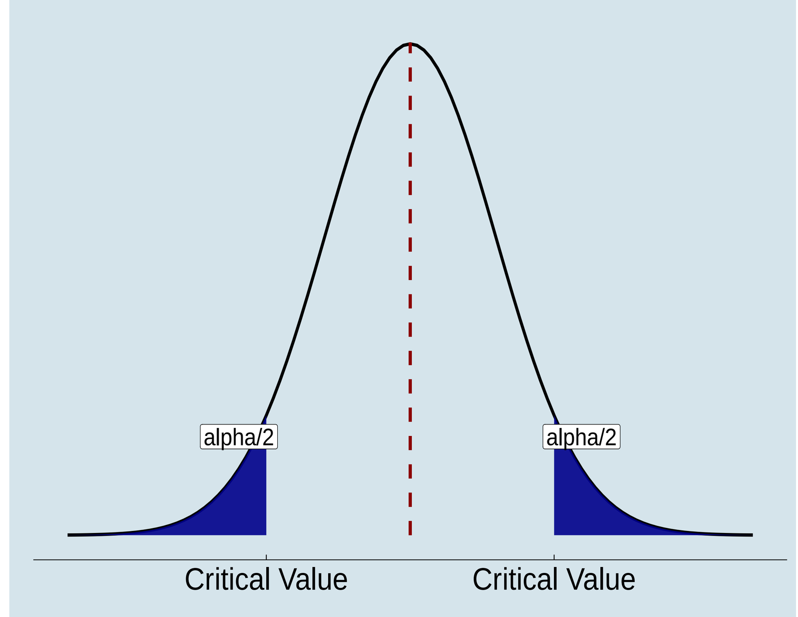


Critical Value = NORMSINV(1-α)

$H_a : \mu \neq ...$

If the test statistic is **negative**, use 2*NORMSDIST(z).

If the test statistic is **positive**, use 2*(1-NORMSDIST(z))



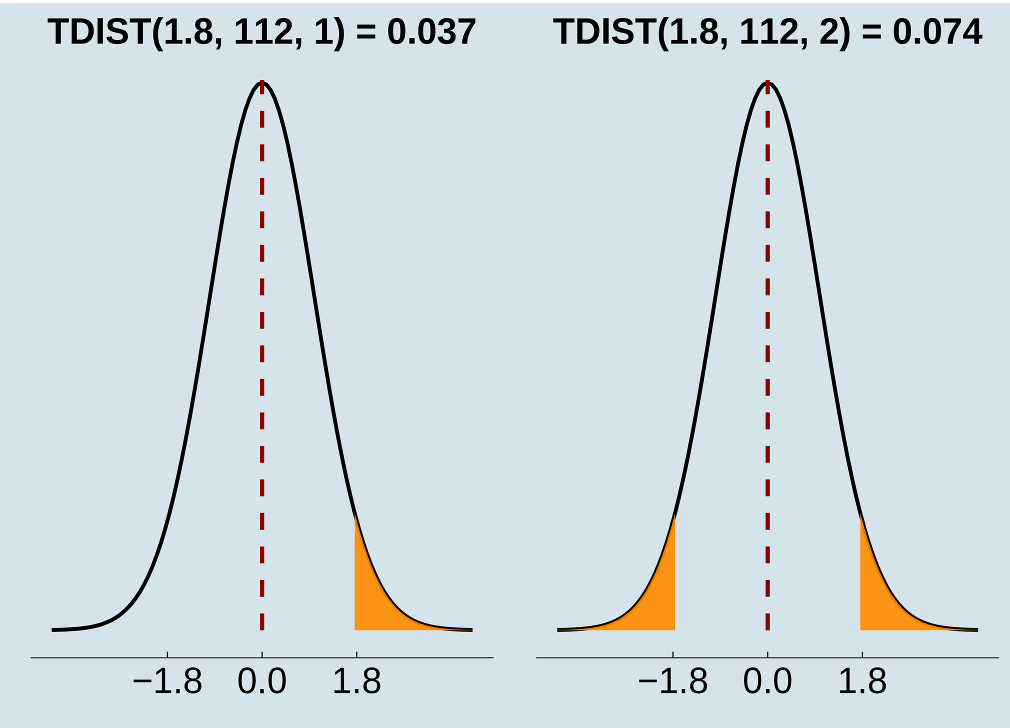
Negative Critical Value (left) = NORMSINV($\frac{\alpha}{2}$)

Positive Critical Value (right) = NORMSINV($1 - \frac{\alpha}{2}$)

t Distribution

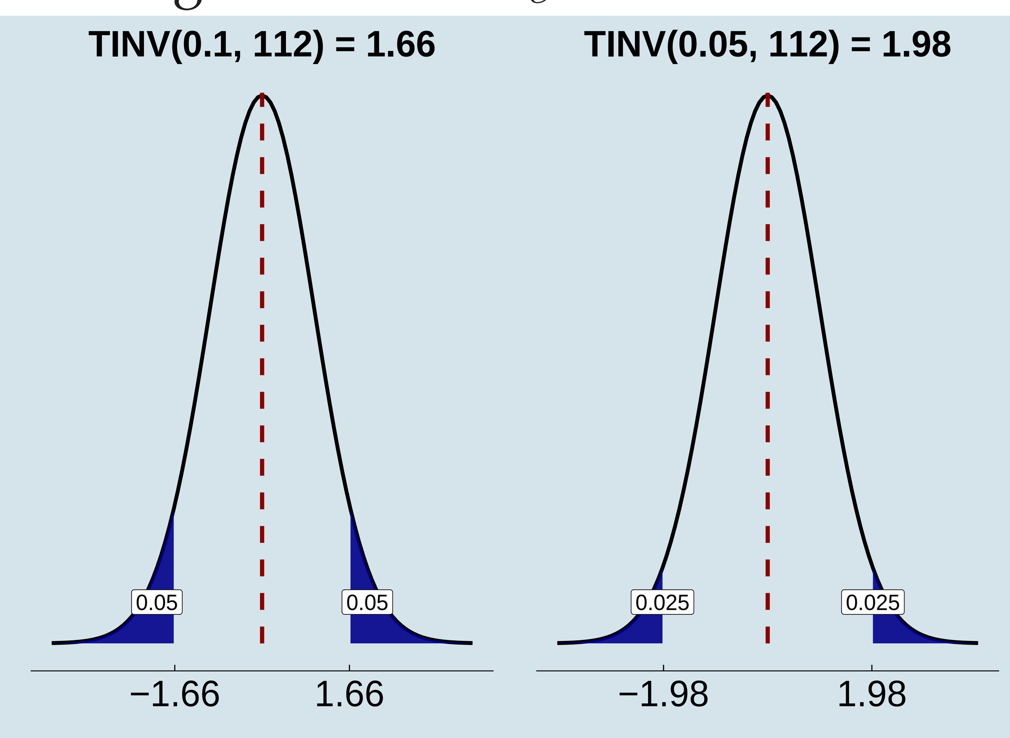
- The center is zero
- Symmetric
- bell-shaped
- TDIST for pvalues

  TDIST returns either the **right-tail** or the **two-tail** probability of the t-distribution based on the **positive test statistic**, degrees of freedom, and number of tails of test you input. **Again: the function does not accept negative values.** So use $|t|$ and explore the distribution's symmetry.



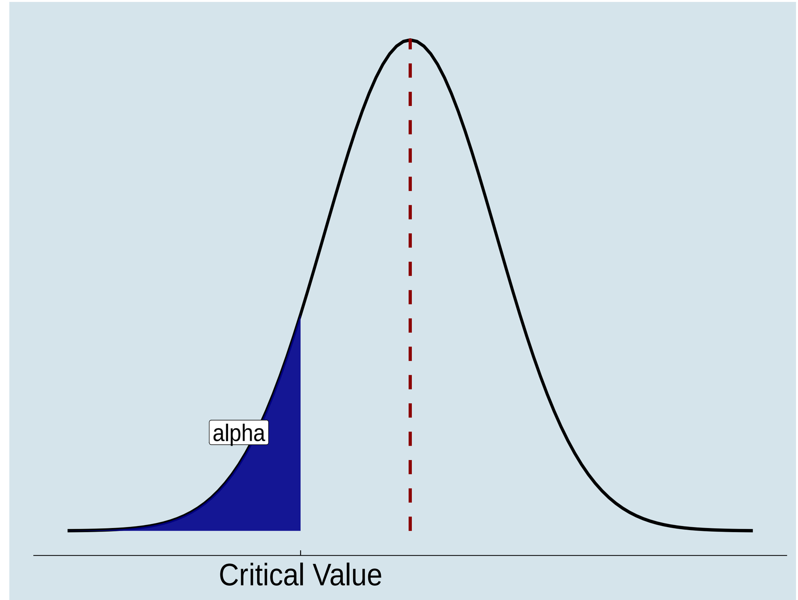
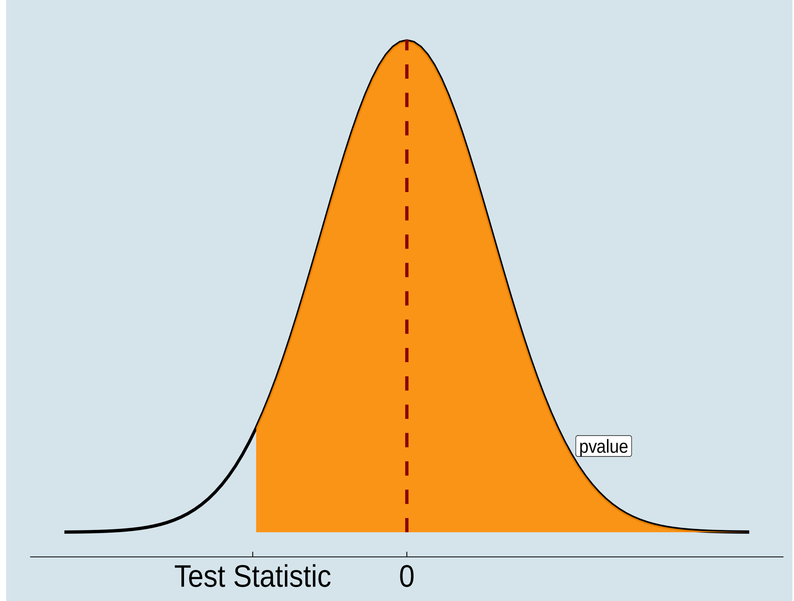
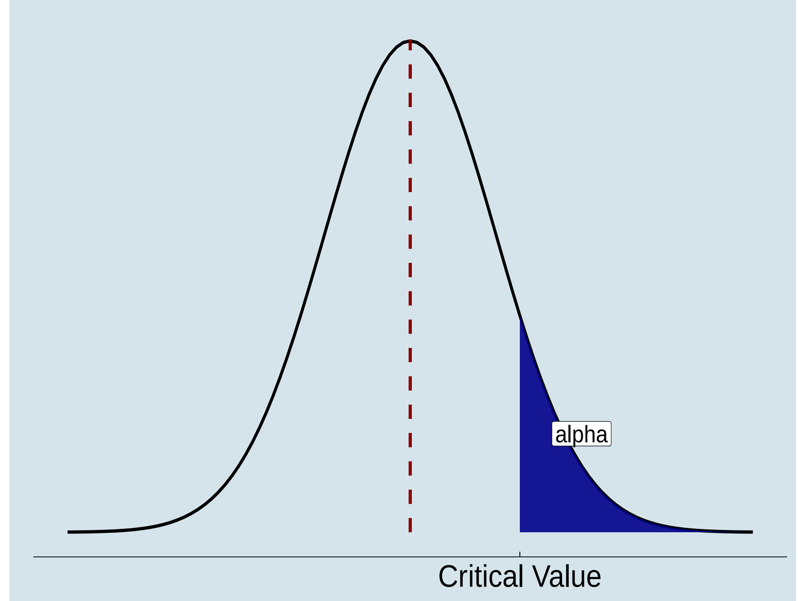
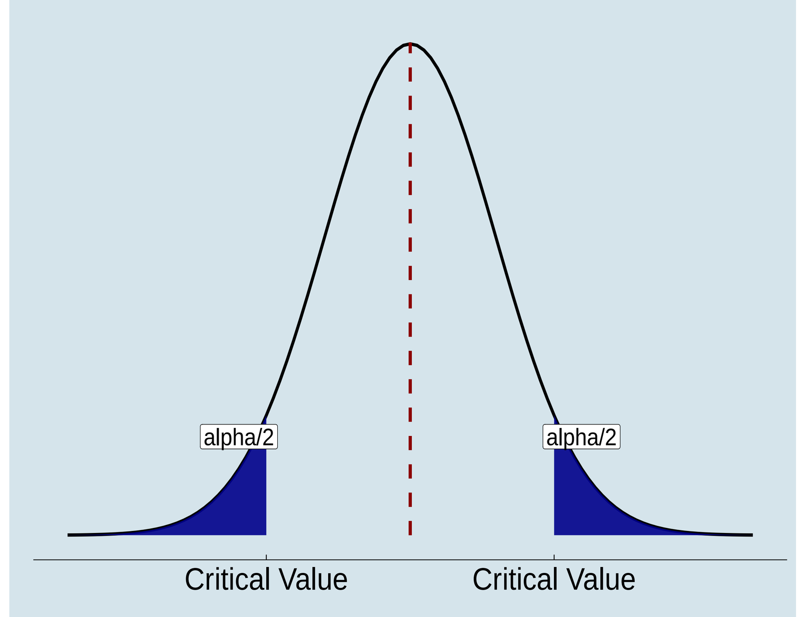
- TINV for critical values

  TINV returns the positive critical value of the t-distribution **based on the two-tail probability you input**. **Again: the function, by default, divides the probability you input.** So multiply your α by two to get a one-tail t_c.



Hypothesis Testing

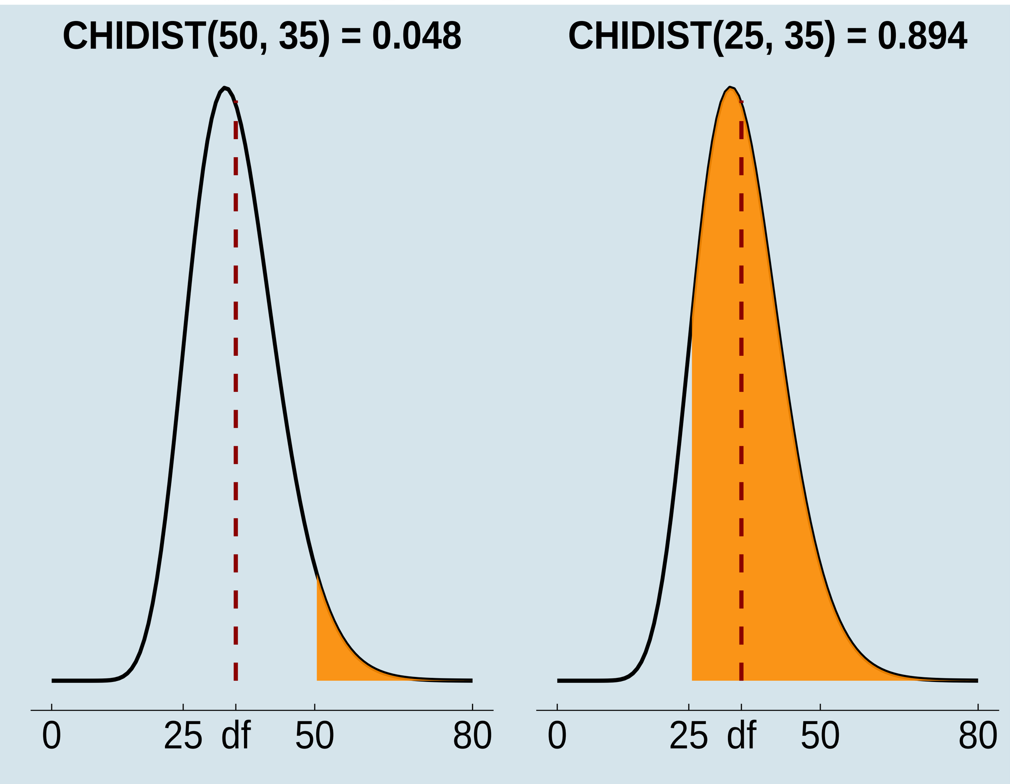
Using TDIST and TINV

Alternative Hypothesis	Where is the pvalue?	How to get the pvalue?	Where is the rejection region?	How to get t_c?
$H_a : \mu < ...$		You want the area to the **left** of your test statistic. If your t is negative, use TDIST($-t$, df, 1). If your t is positive, use 1-TDIST(t, df, 1).		Critical Value = -TINV($2 * \alpha$, df)
$H_a : \mu > ...$		You want the area to the **right** of your test statistic. If your t is negative, use 1-TDIST($-t$, df, 1). If your t is positive, use TDIST(t, df, 1).		Critical Value = TINV(2*α, df)
$H_a : \mu \neq ...$		If the test statistic is **negative**, use TDIST($-t$, df,2) If the test statistic is **positive**, use TDIST(t, df,2)		Negative Critical Value (left) = -TINV(α, df) Positive Critical Value (right) = TINV(α, df)

χ^2 Distribution

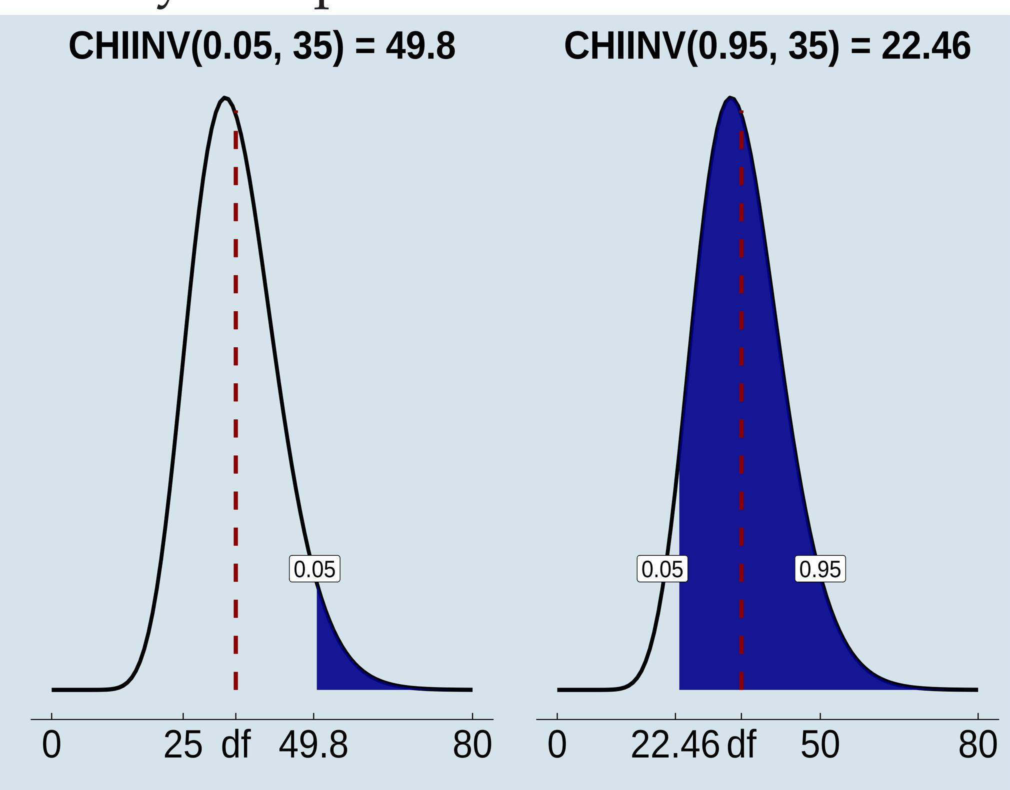
- It does not contain negative values
- General shape is skewed to right
- The number of degrees of freedom is an approximation of the center
- CHIDIST for pvalues

  CHIDIST returns the **right-tailed probability** of the chi-squared distribution based on your test statistic and degrees of freedom you input.



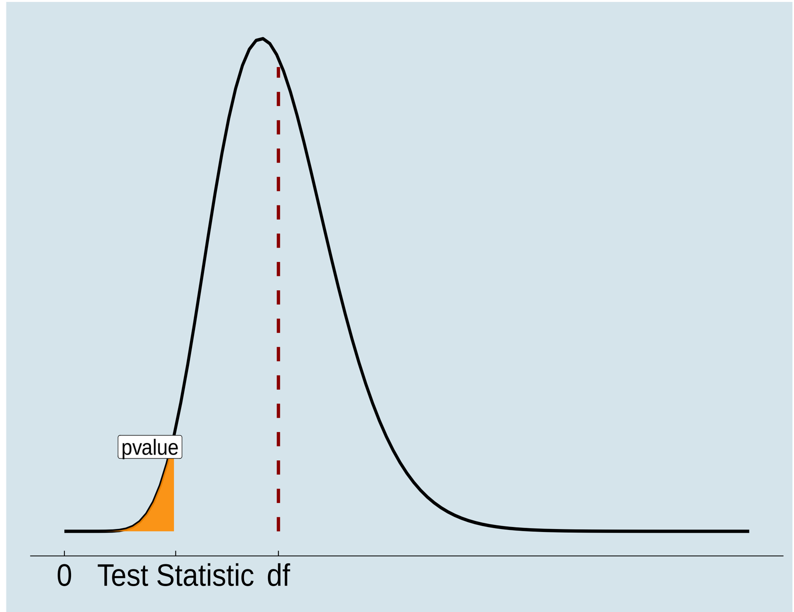
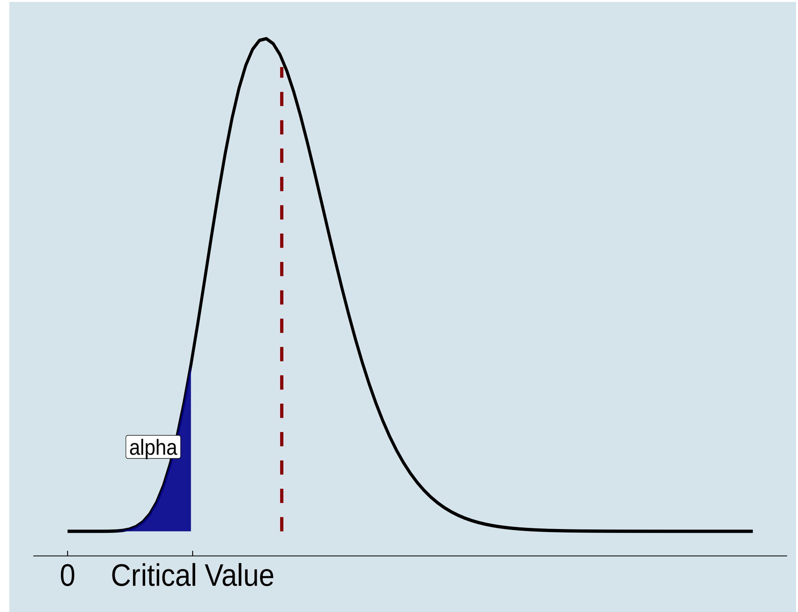
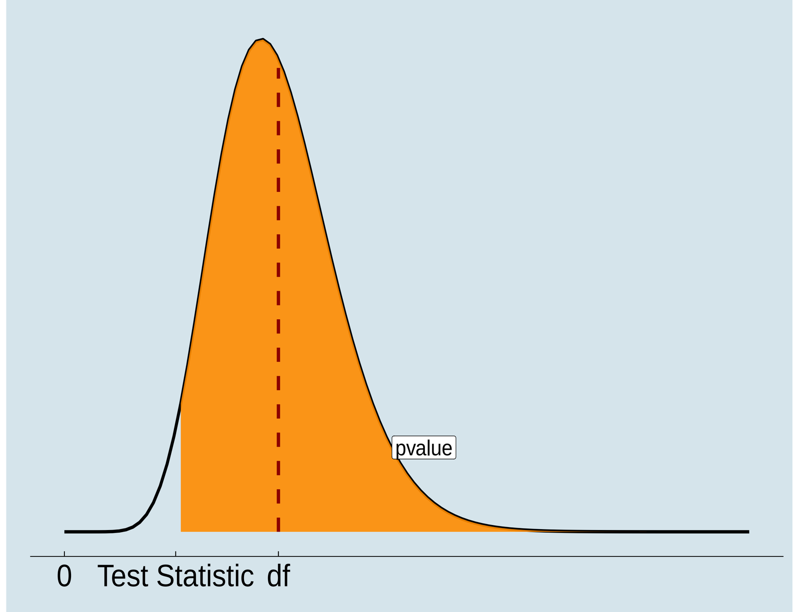
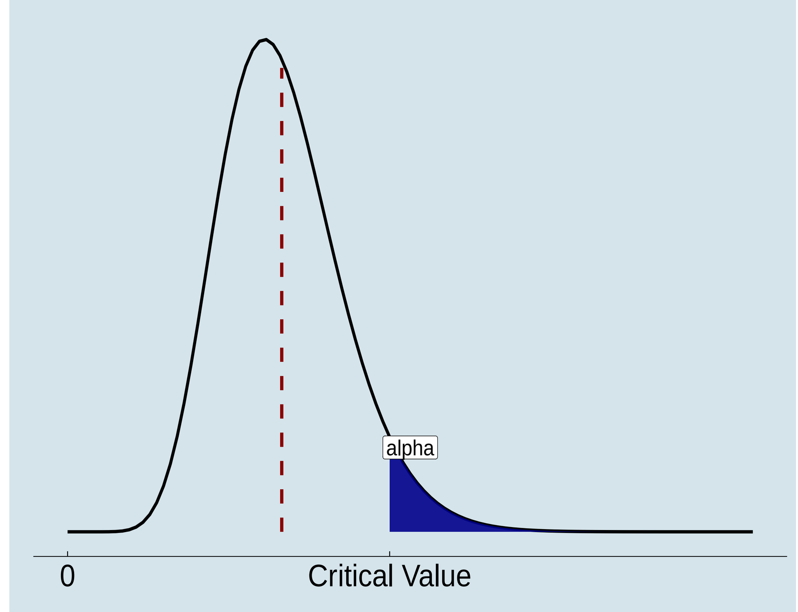
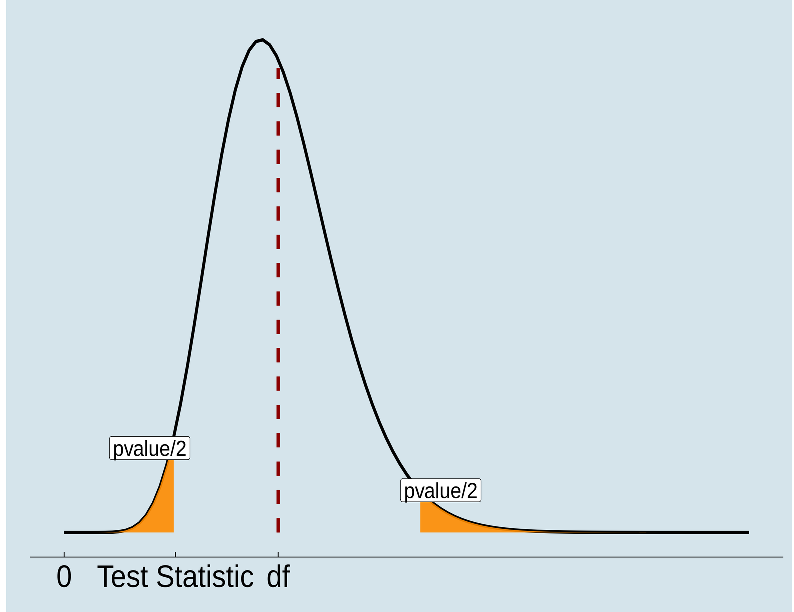
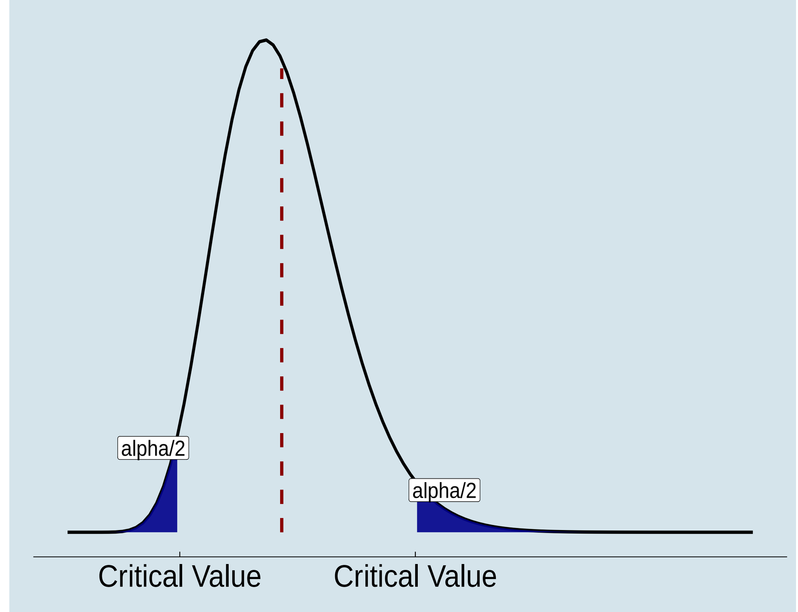
- CHIINV for critical values

  CHIINV returns the critical value of the chi-squared distribution based on the **right-tail probability** and degrees of freedom you input.



Hypothesis Testing

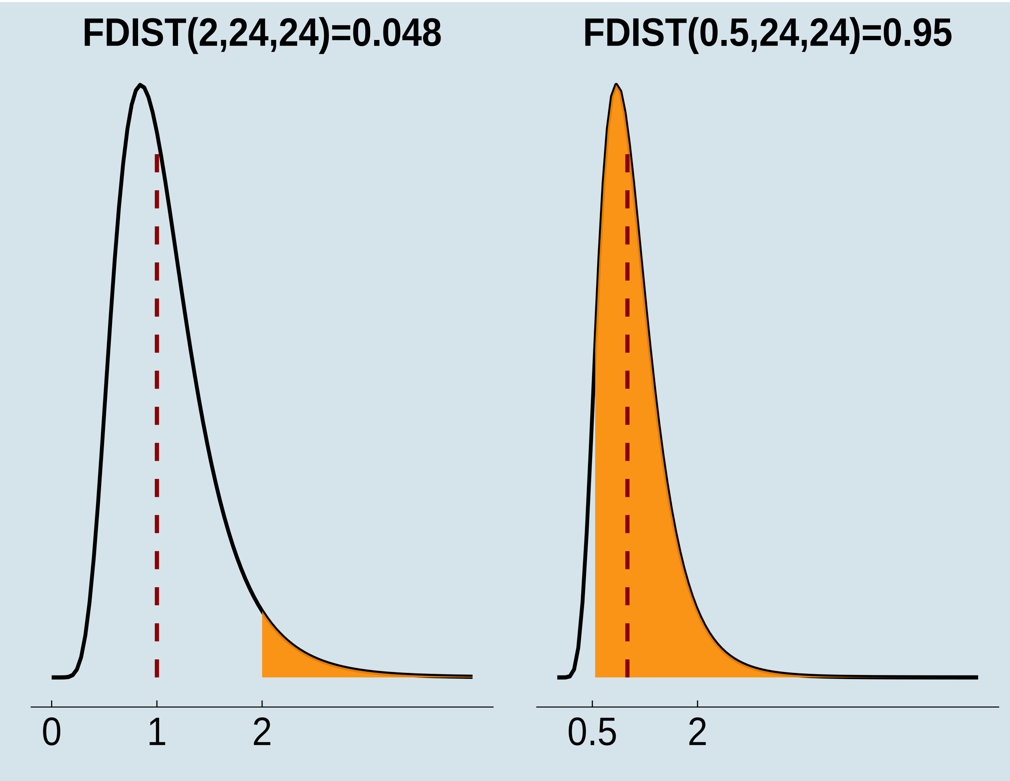
Using CHIDIST and CHIINV

Alternative Hypothesis	Where is the pvalue?	How to get the pvalue?	Where is the rejection region?	How to get χ^2_c?
$H_a : \sigma^2 < ...$		You want the area to the **left** of your test statistic. Therefore, use 1-CHIDIST(χ^2, df)		Critical Value = CHIINV($1 - \alpha$,df)
$H_a : \sigma^2 > ...$		You want the area to the **right** of your test statistic. Therefore, use CHIDIST(χ^2, df)		Critical Value = CHIINV(α,df)
$H_a : \sigma^2 \neq ...$		If the test statistic is **less than** df, use 2*(1-CHIDIST(χ^2, df)) If the test statistic is **greater than** df, use 2*CHIDIST(χ^2, df)		Left Critical Value = CHIINV($1 - \frac{\alpha}{2}, df$) Right Critical Value = CHIINV($\frac{\alpha}{2}, df$)

F Distribution

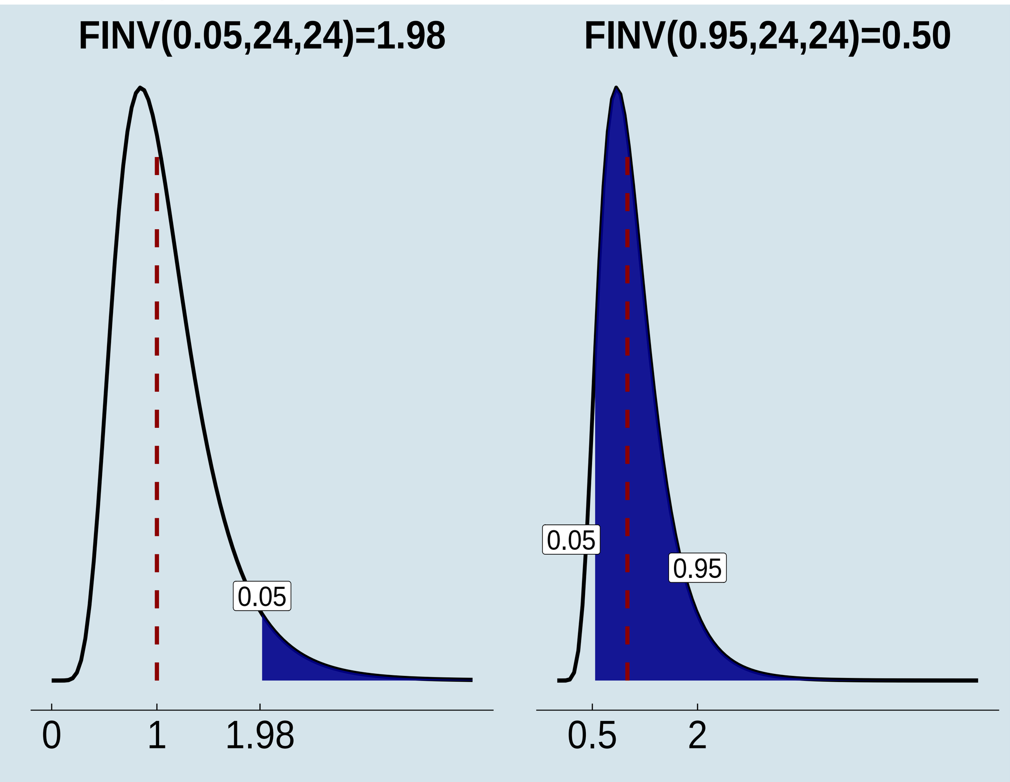
- It does not contain negative values
- General shape is skewed to right
- 1 is an approximation of the center
- FDIST for pvalues

  FDIST returns the **right-tailed probability** of the F distribution based on the test statistic and two degrees of freedom (df_1, df_2) you input.



- FINV for critical values

  FINV returns the critical value from the F distribution based on the right tail probability and df_1, df_2.

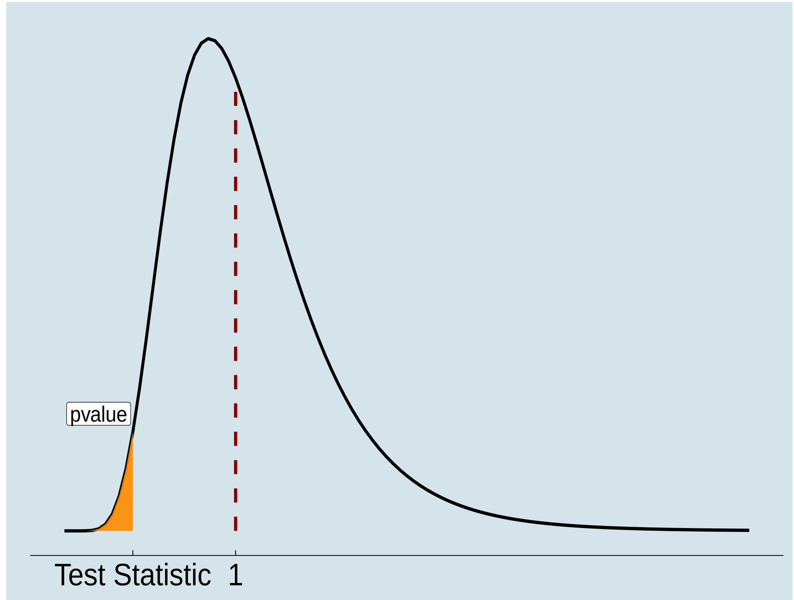


Hypothesis Testing

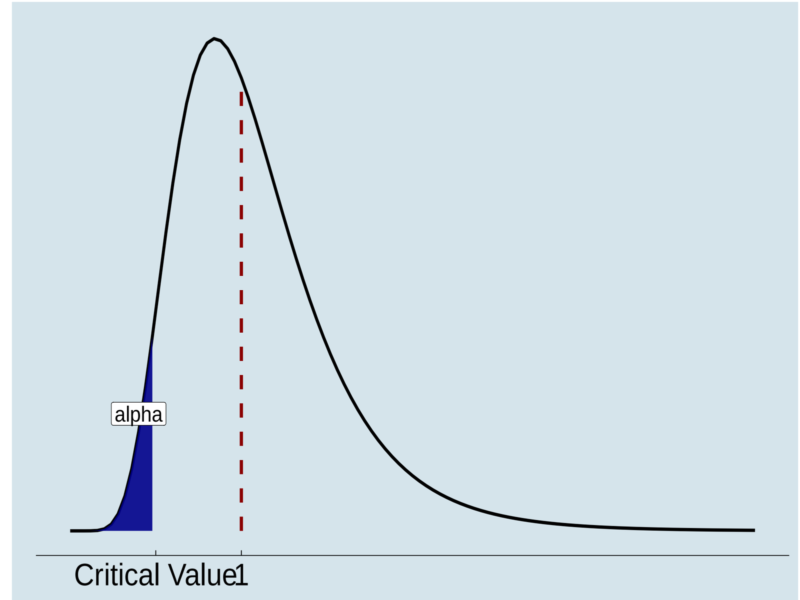
Using FDIST and FINV

Alternative Hypothesis | **Where is the pvalue?** | **How to get the pvalue?** | **Where is the rejection region?** | **How to get F_c?**

$H_a : \frac{\sigma_1^2}{\sigma_2^2} < \ldots$

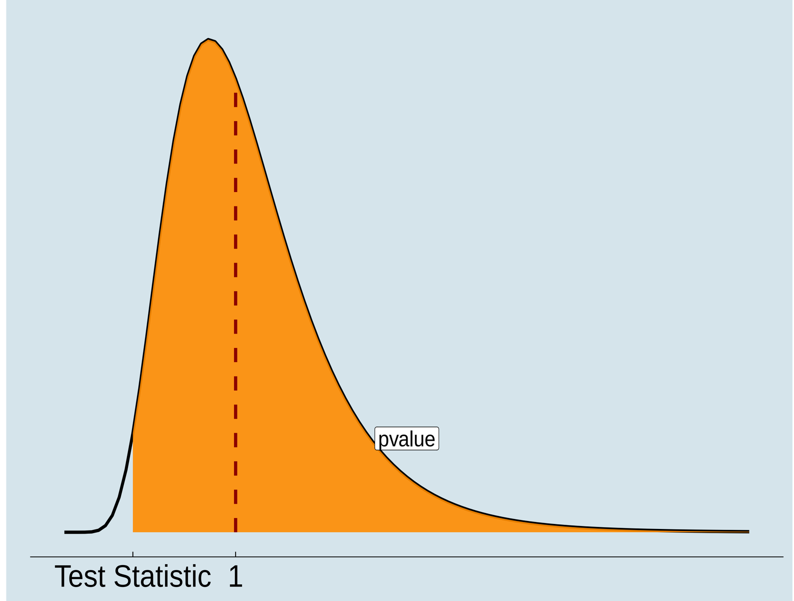


You want the area to the **left** of your test statistic.
Therefore, use
1-FDIST(F, df_1, df_2)

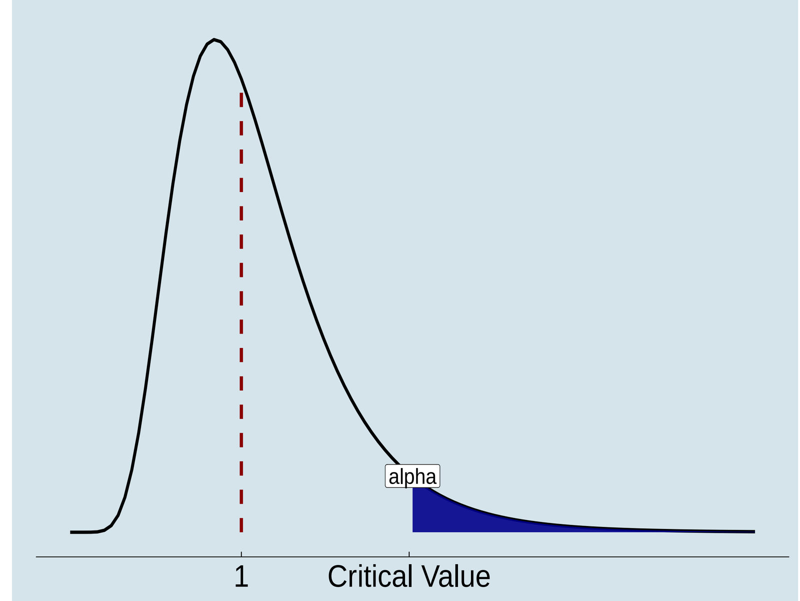


Critical Value =
FINV($1-\alpha, df_1, df_2$)

$H_a : \frac{\sigma_1^2}{\sigma_2^2} > \ldots$

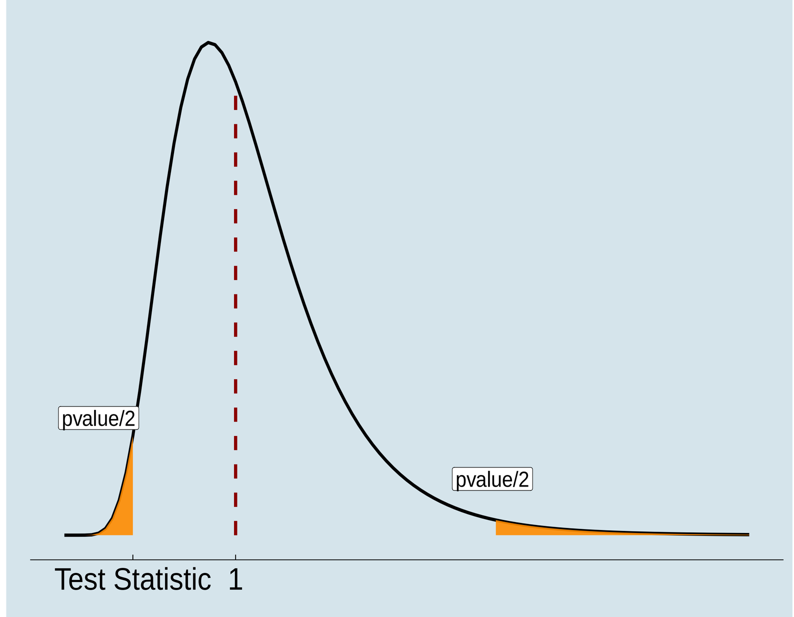


You want the area to the **right** of your test statistic.
Therefore, use
FDIST(F, df_1, df_2)



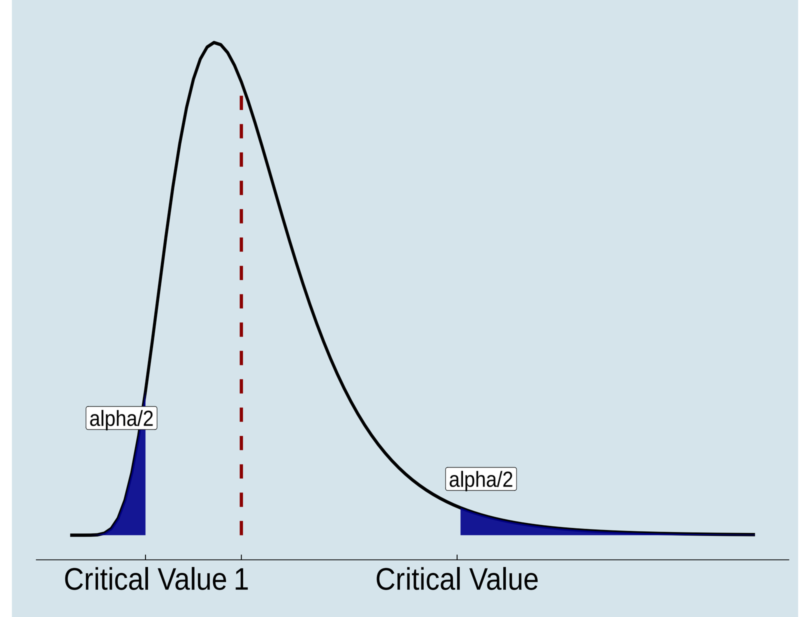
Critical Value =
FINV(α, df_1, df_2)

$H_a : \frac{\sigma_1^2}{\sigma_2^2} \neq \ldots$



If the test statistic is **less than 1**, use
2*(1-FDIST(F, df_1, df_2))

If the test statistic is **greater than 1**, use
2*FDIST(F, df_1, df_2)



Left Critical Value =
FINV($1-\frac{\alpha}{2}, df_1, df_2$)

Right Critical Value =
FINV($\frac{\alpha}{2}, df_1, df_2$)