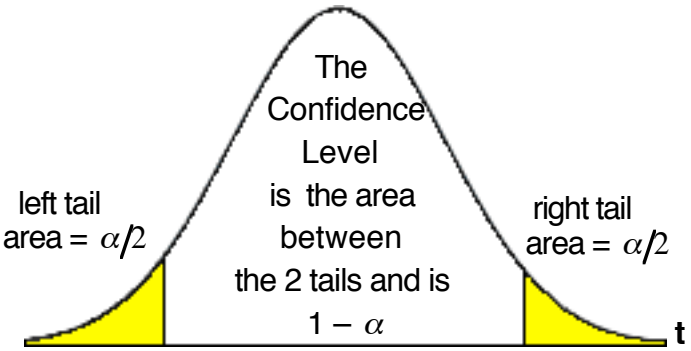
A **Critical Value for a t Distribution** is a **t value on the t axis** that is the vertical boundary **separating the area in one tail of the graph from the remaining area**.

A Confidence Interval is based on the Confidence Level we require
The **Confidence Level** is the area between the Left and Right Tail Areas.

If the **total area in both tails** is α
and this total area is **divided equally between the left and right tails**
then **the left and right tail will each have an area of** $\alpha/2$

The left and right tail will each have a Critical Value of t
that separates
the area in the tail of the graph from the remaining area



t = – ??
left tail
negative
critical value the area to the left of $-t_{\alpha/2}$ **is** $\alpha/2$

t = + ??
right tail
positive
critical value the area to the right of $+t_{\alpha/2}$ **is** $\alpha/2$

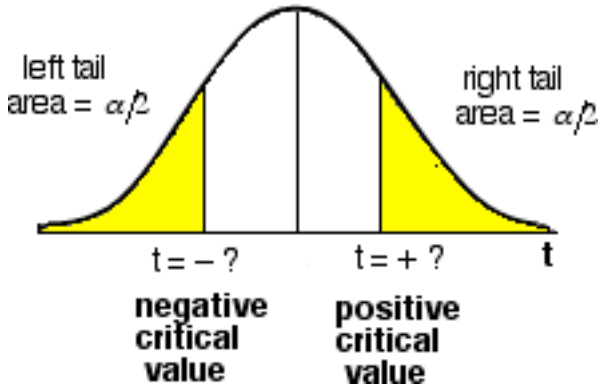
The t distribution is normal

If the positive critical t value for a right tail area is **+A**

then the negative critical t value for a left tail area is **–A**

Two Tail Critical t Values

The area between the two tails is $1-\alpha$
this is the value of the **Confidence Level**
the area in each of the 2 tails is $\alpha/2$



The negative critical value is the negative t score that has an area of $\alpha/2$ in the left tail

The positive critical value is the **positive t score** that has an area of $\alpha/2$ **in the right tail**

The t table below is used to find the positive t score for the **listed area in the RIGHT TAIL**
the positive t score is based on the **area in the RIGHT TAIL**
and the the degrees of freedom
which is equal to n – 1
where n is the sample size

t Distribution: Critical t Values					
Degrees of	Area In One Tail (Right Tail)				
Freedom	0.100	0.050	0.025	0.010	0.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
Distribution					

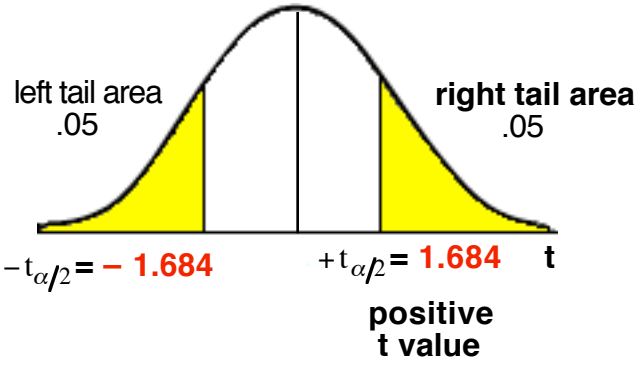
Finding The Right Tail Critical Value for the t Distribution

Example 1

Find the Critical Value for t with an **area in the right tail of .05** and n = 41

If n = 41 then the Degrees of Freedom = n – 1= 41 – 1= 40

DF = 41–1 = **40**



If the area in the right tail is 0.05 **for DF =** 40 **then t = 1.684**

t Distribution: Critical t Values					
Degrees of	Area In One Tail (Right Tail)				
Freedom	0.100	0.050	0.025	0.010	0.005
40	1.303	1.684	2.021	2.423	2.704

Finding The Left Tail Critical Value for the t Distribution

The table for the t distribution only contains the positive t values for **right tail areas**. This means that only positive t values can be read from the table. How do I find negative t values for **left tail areas?**

For a given value of n
If the positive critical t value for a right tail area of α is **+A**

then the negative critical t value for a left tail area of α is **–A**

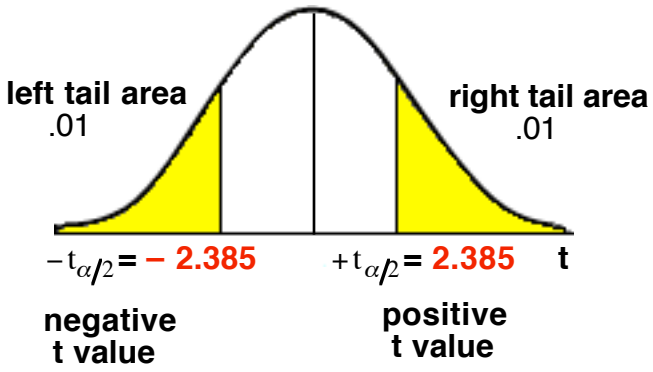
If the area in the right tail has a positive critical value of t = 1.684
then the left tail has a negative value of t = – 1.684

Finding The Right Tail Critical Value for the t Distribution

Example 2

Find the Critical Value for t with an **area in the right tail of .01 and** n = 66

DF = 66–1 = **65**



If n = 66 then the Degrees of Freedom = n – 1= 66 – 1= 65

If the area in the right tail is 0.01 for DF = 65 then

t = 2.385

t Distribution: Critical t Values					
Degrees of	Area In One Tail (Right Tail)				
Freedom	0.100	0.050	0.025	0.010	0.005
65	1.295	1.669	1.997	2.385	2.645

Finding The Left Tail Critical Value for the t Distribution

For a given value of n
If the positive critical t value for a right tail area of α is **+A**

then the negative critical t value for a left tail area of α is **–A**

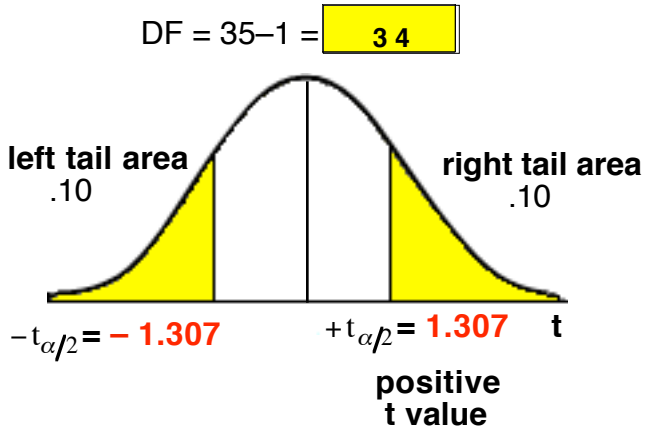
If the area in the right tail has a positive critical value of t = 2.385

then the left tail has a negative value of t = – 2.385

Finding The Right Tail Critical Value for the t Distribution

Example 3

Find the Critical Value for t with an **area in the right tail of .10** and n = 35



If n = 35 then the Degrees of Freedom = n – 1= 35 – 1= 34

If the area in the right tail is 0.1 for DF = 34 then

t = 1.307

t Distribution: Critical t Values					
Degrees of	Area In One Tail (Right Tail)				
Freedom	0.100	0.050	0.025	0.010	0.005
34	1.307	1.691	2.032	2.441	2.728