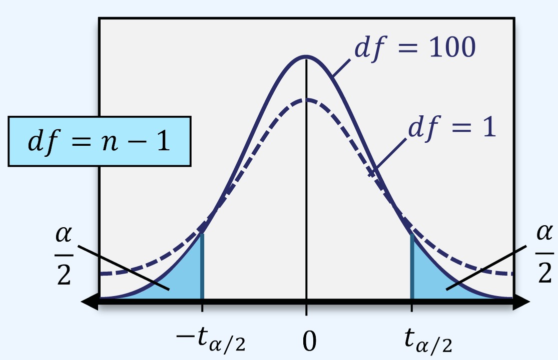
TOPIC: CONFIDENCE INTERVALS FOR VARIANCE

Critical Values: Chi Square Distribution

◆ Like the normal & t-dist., the χ^2-dist. is used for confidence intervals but is ______________ & ALWAYS positive.

Recall — **t - Distribution**

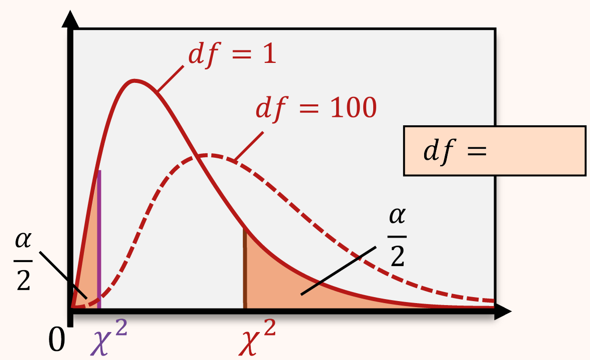


t-table: Look up **[1 | 2]** value(s)

$t_{\alpha/2}$ using $\alpha/2$, then flip sign for other val.

Conf. Lev.	50%	...	90%	95%	99%
↓ df | $\alpha/2$ →	0.50	...	0.05	0.025	0.005
1	1.000	...	6.314	12.71	63.66
2	0.816	...	2.920	4.303	9.925
...	...	...	...	...	...
30	0.683	...	1.697	2.042	2.750

New — **χ^2- Distribution**



χ^2-table: Look up **[1 | 2]** value(s)

χ^2_L using ______ χ^2_R using ______

	Area to *RIGHT* of χ^2 Value				
df ↓	0.995	0.975	...	0.025	0.005
1	--	0.001	...	5.024	7.879
2	0.010	0.020	...	7.380	10.60
...	...	...	...	...	...
30	13.78	16.79	...	46.98	53.67

EXAMPLE Find the χ^2 values for a 95% confidence interval with sample size $n = 31$.

$\alpha =$ _______ $df =$ _______

$\alpha/2 =$ _______ $\chi^2_R =$ _______

$1 - \alpha/2 =$ _______ $\chi^2_L =$ _______

TOPIC: CONFIDENCE INTERVALS FOR VARIANCE

PRACTICE Use a table to find or estimate χ^2 such that:

(A)

$P(X^2 > \chi^2) = 0.010$ *(Area to the **right**)*

$df = 50$

(B)

$P(X^2 < \chi^2) = 0.010$ *(Area to the **left**)*

$df = 50$

EXAMPLE Use a table to find or estimate χ^2 such that:

$P(X^2 > \chi^2) = 0.025$ *(Area to the **right**)*

$df = 45$

PRACTICE Find the left and right χ^2-values for a 99% confidence interval with a sample size of 25.

$\alpha =$ ________ $df =$ ________

$\alpha/2 =$ ________ $\chi^2_R =$ ________

$1 - \alpha/2 =$ ________ $\chi^2_L =$ ________

TOPIC: CONFIDENCE INTERVALS FOR VARIANCE

EXAMPLE Find the left and right χ^2-values for each of the following confidence intervals.

($\boldsymbol{A}$) Confidence level = 90%, sample size = 17

$\alpha =$ _______ $df =$ _______

$\alpha/2 =$ _______ $\chi^2_R =$ _______

$1 - \alpha/2 =$ _______ $\chi^2_L =$ _______

($\boldsymbol{B}$) Confidence level = 90%, sample size = 61; Are these values ***closer*** or ***further apart*** than those from ($\boldsymbol{A}$)?

$\alpha =$ _______ $df =$ _______

$\alpha/2 =$ _______ $\chi^2_R =$ _______ Increasing sample size makes χ^2-values

$1 - \alpha/2 =$ _______ $\chi^2_L =$ _______ **[CLOSER | FURTHER APART]**

($\boldsymbol{C}$) Confidence level = 99%, sample size = 17; Are these values ***closer*** or ***further apart*** than those from ($\boldsymbol{A}$)?

$\alpha =$ _______ $df =$ _______

$\alpha/2 =$ _______ $\chi^2_R =$ _______ Increasing sample size makes χ^2-values

$1 - \alpha/2 =$ _______ $\chi^2_L =$ _______ **[CLOSER | FURTHER APART]**