

Statistics

Lecture 13



Feb 19-8:47 AM

α Alpha

$$0 < \alpha < 1$$

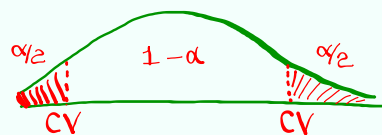
Significance level

If not given \Rightarrow Use .05

$\alpha/2$ is the area on each tail of the graph of Prob. dist.

$1 - \alpha$ is the middle area

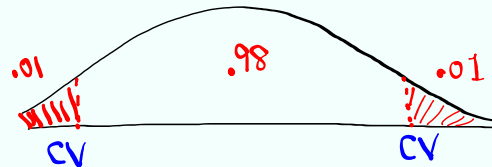
$(1 - \alpha) \cdot 100\% \rightarrow$ Confidence level



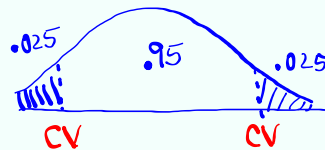
The Value or Values that separate the $\alpha/2$ regions from $1 - \alpha$ Region is called Critical Value.

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Ex $\alpha = .02$ Sig. level
 $\alpha/2 = .01$ Area on each tail
 $1 - \alpha = .98$ Middle Area
 $(.98)100\% = 98\%$ Conf. level.



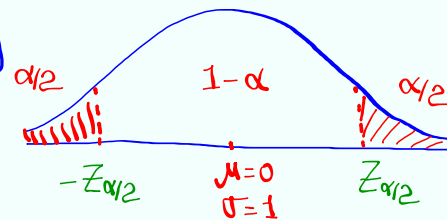
when α unknown (Not given)
 we use .05 Significance level
 $\alpha/2 = .025$ Area on each tail
 $1 - \alpha = .95$ Middle area
 $(.95)100\% = 95\%$ Conf. level



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$Z_{\alpha/2}$ is the critical value with standard Normal Prob. dist. with right-tail area of $\alpha/2$.

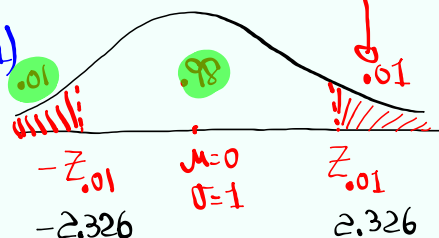
we use invNorm to find $Z_{\alpha/2}$.



find $Z_{.01}$

$Z_{.01} = \text{invNorm}(.99, 0, 1)$

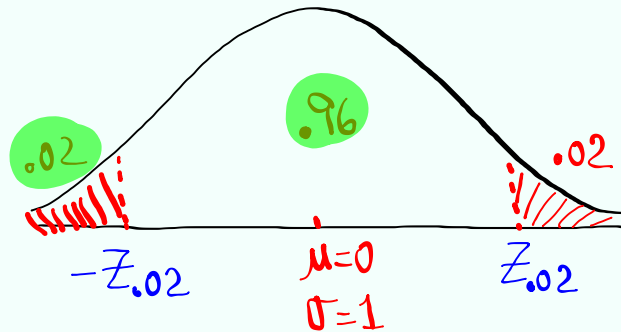
2.326



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Find $Z_{\alpha/2}$ for $\alpha = .04$

$$\alpha/2 = .04/2 = .02$$



$$Z_{.02} = \text{invNorm}(.98, 0, 1) = \boxed{2.054}$$

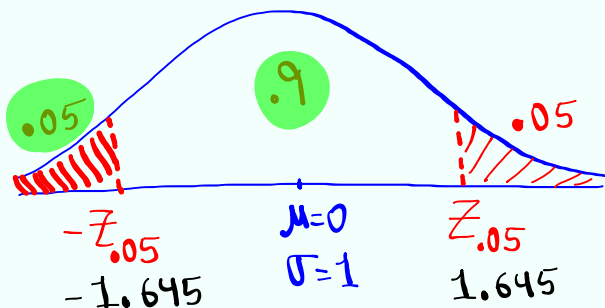
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Find $\pm Z_{\alpha/2}$ for 90% Conf. level.

Middle Area .9

$$1 - \alpha = .9 \rightarrow \alpha = .1$$

$$\alpha/2 = .05$$



$$Z_{.05} = \text{invNorm}(.95, 0, 1) = \boxed{1.645}$$

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t - Distribution

- Bell-Shape

- Symmetric

- Total Area = 1

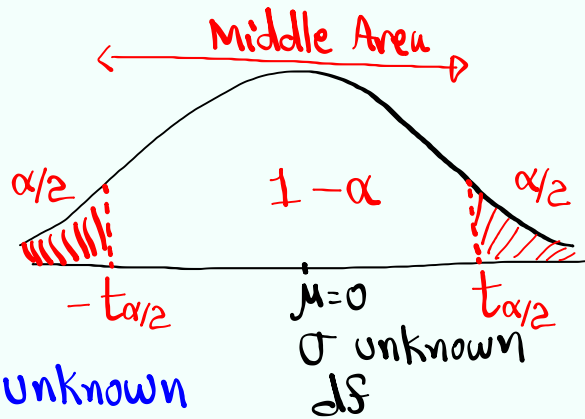
- $\mu = 0$ but σ unknown

- It comes with degrees of freedom df .

To find $t_{\alpha/2}$

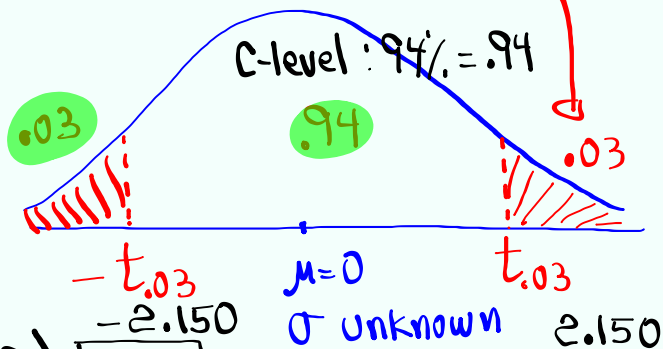
we use TI Command

$invT(\text{Area}, df)$



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Find $t_{.03}$ with $df = 9$.



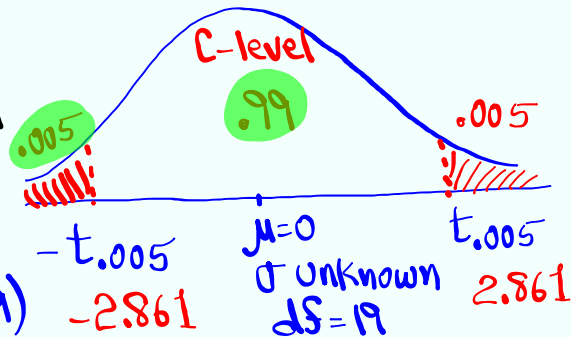
$$t_{.03} = invT(.97, 9) = 2.150$$

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Find $\pm t_{\alpha/2}$ for $\alpha = .01$ with $df = 19$.

$$\alpha/2 = .01/2 = .005$$

↑
Area of
each tail



$$t_{.005} = \text{invT}(.995, 19)$$

$$= \boxed{}$$

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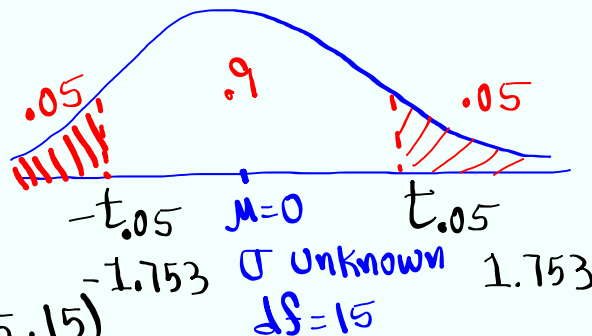
Find $\pm t_{\alpha/2}$ for 90% C-level and $df = 15$.

Middle Area
.9

$$1 - \alpha = .9$$

$$\alpha = .1$$

$$\alpha/2 = .05$$



$$t_{.05} = \text{invT}(.95, 15)$$

$$= \boxed{1.753}$$

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What is degrees of freedom?

It varies by topic.

We find them by topics as well.

20 students,

I bring 20 Donuts.

$$df = 19$$

David choices 20

Evelyn = 19

Abigail = 18

⋮

Li

= 0
(1 donut left)

Josh has 7 clean shirts

He plans to wear one clean shirt

per day.

$$df = 6$$

Monday 7

Wednesday 5

⋮

Tuesday 6

⋮

Sunday 0
(1 clean shirt)

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