Statistics
Spring 2023
Lecture 46

Feb 19-8:47 AM

Class QZ 12

Drawing, labeling, shading, TI command required

1) Find $t_{\alpha/2}$ for 96% C-level with df=14.

middle area .96

.02 | .96 | .02

$\mu=0$, σ unknown, df=14

$t_{\alpha/2} = \text{invT}(.98, 14) = 2.264$

Left Area

$1-.96=.04$ ↑ α

$.04/2=.02$ ↑ $\alpha/2$

2) Find the area to the left of $\chi^2=3.25$ with df=10.

$\chi^2\text{cdf}(0, 3.25, 10) = .025$

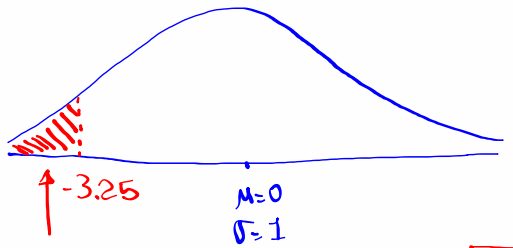
L, U, df

0 3.25

May 4-7:44 AM

Find the area to the left of $Z = -3.25$.

$N(0,1)$

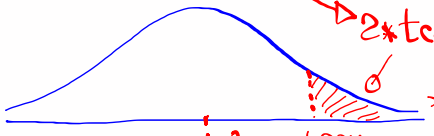


normalcdf(-E99, -3.25, 0, 1) = 5.771×10^{-4}

Find twice the area to the right of $t = 1.234$ with $df = 12$.

t-dist
μ=0
σ unknown

2*tcdf(1.234, E99, 12) = .241



May 8-7:20 AM

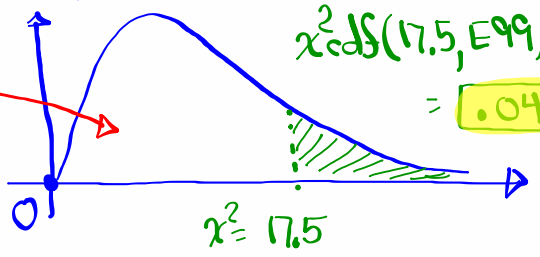
Given $df = 9$, find the area on each side of $\chi^2 = 17.5$, then multiply the smaller area by 2.

χ^2-Dist.

Start at 0, skewed to the right

χ^2cdf(0, 17.5, 9) = .959

χ^2cdf(17.5, E99, 9) = .041



2* Smaller area

$= 2 * .041 = .082$

May 8-7:26 AM

30% of 285 teachers in LAUSD had a second job. $n = 285$, $\hat{p} = .3$, $\hat{q} = .7$

1) How many of them had a second job?

$x = n\hat{p} = 285(.3) = 85.5$ → Always Round-up → $x = 86$

2) Find Conf. interval for the proportion of all teachers in LAUSD that have a second job. Give margin of error in %.

No C-level ⇒ .95

1-PropZInt

$x = 86$

$n = 285$

C-level: .95

$.248 < p < .355$

$(.248, .355)$

$25\% < p < 36\%$

$E = \frac{.355 - .248}{2}$

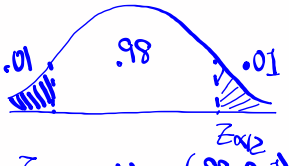
$= .054 \approx 5\%$

May 8-7:31 AM

Find the minimum number of teachers needed if we wish to construct 98% confidence interval and margin of error not to exceed 4%.

If we use $\hat{p} = .3$ & $\hat{q} = .7$

$n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$



$z_{\alpha/2} = \text{invNorm}(.99, 0, 1) = 2.326$

$= (.3)(.7)\left(\frac{2.326}{.04}\right)^2 = 710.0987\ldots$

$n \approx 711$

If we do not use $\hat{p}$ & $\hat{q}$,

$n = .25\left(\frac{z_{\alpha/2}}{E}\right)^2 = .25\left(\frac{2.326}{.04}\right)^2 = 845.3556\ldots$

$n = 846$

May 8-7:39 AM

28 randomly selected teachers from LAUSD had a mean age of 42.5 yrs with standard deviation of 8.75 yrs.

$n=28$, $\bar{x}=42.5$, $S=8.75$

1) Find 90% conf. interval for the mean age of all teachers in the district. Find its margin of error, rounded to whole #.

→ C-level: .9

$<\mu<$

If σ known → ZInterval

If σ unknown → TInterval inpt: Stats

Since $\bar{x}$ is in 1 decimal → we round to 1 decimal

$\bar{x}=42.5$
$S=8.75$
$n=28$
C-level: .9

$39.7<\mu<45.3$

$E=\frac{45.3-39.7}{2}=2.8$ $E=3$

May 8-7:46 AM

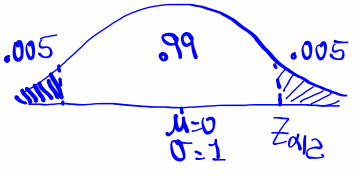
Find the minimum number of teachers needed to construct 99% conf. interval for the mean age of all teachers if we wish the margin of error not to exceed 5 yrs.

$n=\left(\frac{z_{\alpha/2}\cdot\sigma}{E}\right)^2$ but if σ unknown, use S instead → $n=\left(\frac{z_{\alpha/2}\cdot S}{E}\right)^2$

$n=\left(\frac{2.576\cdot 8.75}{5}\right)^2$

$=20.322\ldots$

$n=21$



$z_{\alpha/2}=\text{invNorm}(.995,0,1)$

$=2.576$

May 8-7:55 AM

I randomly selected 10 teachers from LAUSD.
Here are their ages:

48 52 60 65 35
30 45 40 46 44

1) Find $\bar{x}$ & S. Round to 1-decimal.

$\bar{x} = 46.5$, $S = 10.6$

2) Find Conf. interval for the mean age of all teachers in LAUSD.

↳ NO C-level ⇒ use .95

σ known → ZInterval

σ unknown → TInterval

$38.9 < \mu < 54.1$

Round to 1-decimal since $\bar{x}$ is 1-decimal.

$E = \frac{54.1 - 38.9}{2}$

$= 7.6$

May 8-8:02 AM

Find minimum number of teachers needed to construct 90% C-level and margin of error not to exceed 5 yrs.

$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$

Since σ is unknown, we use S instead.

$n = \left(\frac{z_{\alpha/2} \cdot S}{E}\right)^2$

$z_{\alpha/2} = \text{invNorm}(.95, 0, 1) = 1.645$

$= \left(\frac{1.645 \cdot 10.6}{5}\right)^2$

$= 12.1619\ldots$

SG 22 & SG 23

$n = 13$

May 8-8:09 AM

F – Dist.

1) Graph is Similar to χ^2 – Dist.

2) It comes with two degrees of freedom

Numerator df → Ndf

Denominator df → Ddf

3) Use Use TI Command Fcdf.

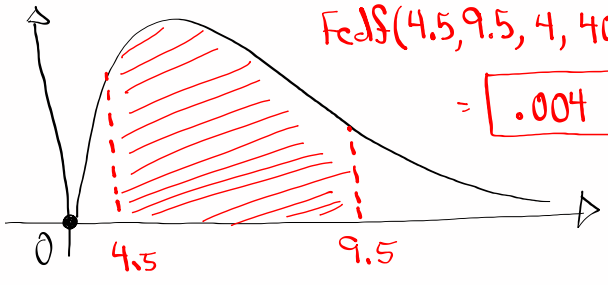
Fcdf (L, U, Ndf, Ddf)

May 8-8:15 AM

Find $P(4.5 < F < 9.5)$ with Ndf=4 & Ddf=40

Fcdf(4.5, 9.5, 4, 40)

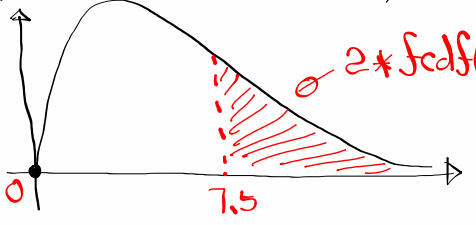
= .004



Find twice the area to the right of $F = 7.5$ with Ndf=5, Ddf=32.

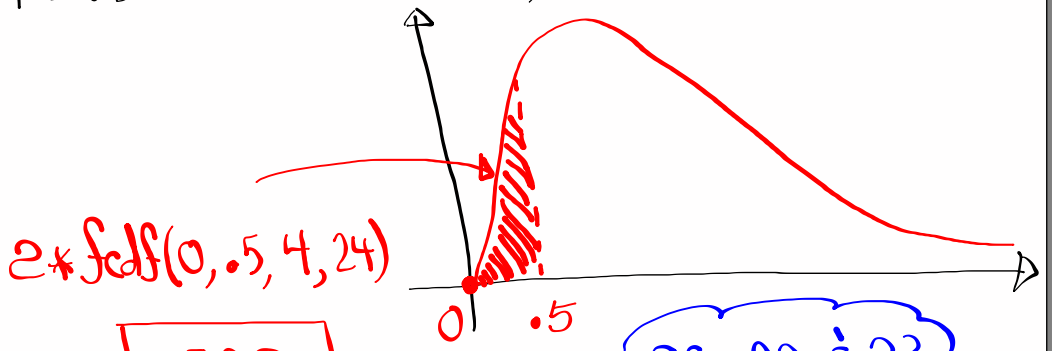
2*fcdf(7.5, E99, 5, 32)

= 1.877×10^{-4}



May 8-8:18 AM

Find twice the area to the left of $F = .5$ with $Ndf = 4$, and $Ddf = 24$.



2*fcdf(0,.5,4,24)

= .528

SG 22 & 23

Be Aware of due dates.

May 8-8:23 AM