Statistics

Lecture 43

Feb 19-8:47 AM

In a Survey of 175 students, 24% of them were in favor of online classes.

1) How many of them were in favor of online classes? $n = 175$, $\hat{p} = .24$

$$x = n\hat{p} = 175(.24) = 42$$

2) Find Confidence interval for the prop. of all students in favor of online classes.

↳ No C-level ⇒ .95

1-PropZInt

$.18 < p < .30$

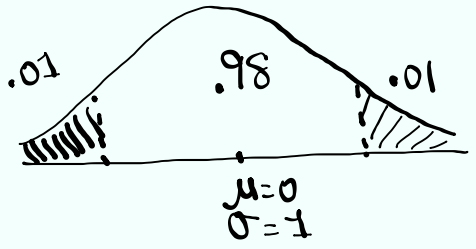
3) Find the margin of error.

$$E = \frac{.30 - .18}{2} = .06$$

Nov 18-8:48 AM

4) find minimum Sample size needed if wish C-level to be 98% and error not to exceed 4%

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



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

$= (.24)(.76)\left(\frac{2.326}{.04}\right)^2$

$= 616.771\ldots$

$n = 617$

Nov 18-8:55 AM

28 randomly selected nurses had a mean age of 38.5 yrs. $n = 28$, $\bar{x} = 38.5$

It is known that standard deviation of ages of all nurses is 7.8 yrs. $\sigma = 7.8$

1) find 90% Conf. interval for the mean age of all nurses.

σ Known → Z Interval

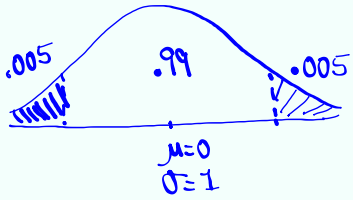
Since $\bar{x}$ is in 1-dec. $36.1 < \mu < 40.9$

2) find margin of error.

$E = \frac{40.9 - 36.1}{2} = 2.4$

Nov 18-9:00 AM

3) Find min. Sample Size needed to Construct 99% Conf. interval for pop. mean with error not to exceed 4 Yrs.



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

$z_{\alpha/2} = \text{invNorm}(.995, 0, 1) = 2.576$

$= \left(\frac{2.576 \cdot 7.8}{4}\right)^2$

Redo with $E = 2$

$n = \left(\frac{2.576 \cdot 7.8}{2}\right)^2 = 100.93\ldots$

$n \approx 101$

$= 25.23\ldots$

$n \approx 26$

Nov 18-9:06 AM

I randomly selected 16 Cars on Certain FWY, here are their speeds.

82	75	68	70
80	60	77	88
55	65	75	85
80	70	60	70

Store in L1

Use [1-Var Stats]

Find

$\bar{x} = 72.5 \approx 73$ } Round to whole #

$s = 9.473 \approx 9$ }

NO C-level $\Rightarrow .95$

1) Find [Conf. interval] for the mean Speed of all Cars on that FWY.

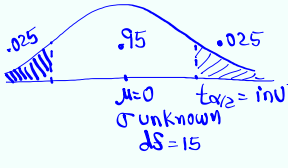
σ unknown $\Rightarrow$ T Interval

Since $\bar{x}$ is whole # $68 < \mu < 78$

2) Find E $E = \frac{78 - 68}{2} = 5$

3) Find $z_{\alpha/2}$ or $t_{\alpha/2}$ for this Problem.

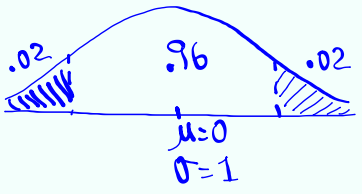
σ unknown $\Rightarrow t_{\alpha/2}$ $df = n - 1 = 15$



$t_{\alpha/2} = \text{invT}(.975, 15) = 2.131$

Nov 18-9:12 AM

4) Find min. number of cars needed to construct 96% Conf. interval for mean speed of all cars and margin of error not to exceed 2.5 miles.



$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E} \right)^2$ (σ unknown, use s)

$z_{\alpha/2} = \text{invNorm}(.98, 0, 1) = 2.054$

$n = \left(\frac{2.054 \cdot 9}{2.5} \right)^2$

$= 54.677$

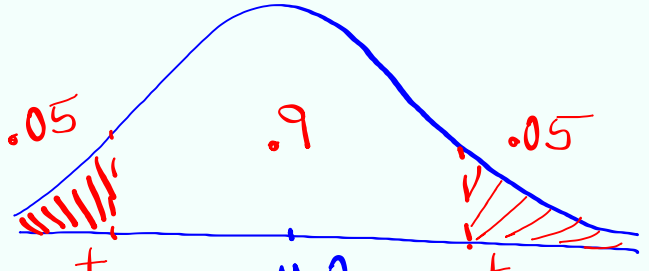
$n = 55$

Redo with $E = 10$

$n = \left(\frac{2.054 \cdot 9}{10} \right)^2 \approx 4$

Nov 18-9:24 AM

Find $\pm t_{\alpha/2}$ for 90% C-level with df = 19.



σ unknown

df = 19

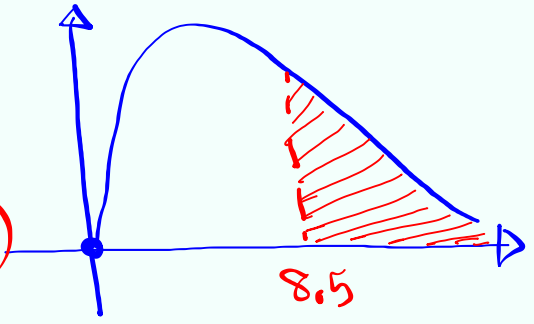
$t_{.05} = \text{invT}(.95, 19) = 1.729$

Nov 18-9:31 AM

Find $P(\chi^2 > 8.5)$ with $df = 6$.

chi-square

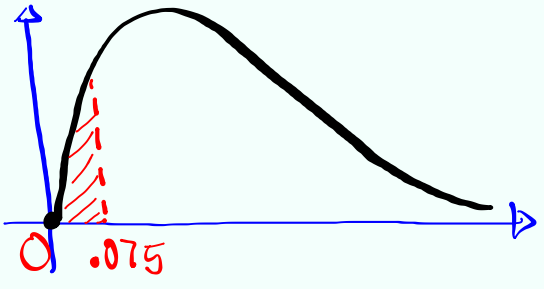
$= \chi^2cdf(8.5, E99, 6)$ (L, U, df)



$= .204$

Nov 18-9:35 AM

Find $P(\chi^2 < .075)$ with $df = 5$.



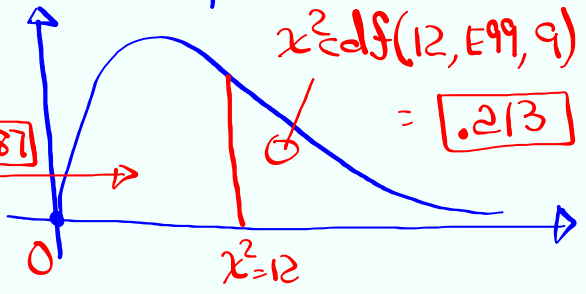
$\chi^2cdf(0, .075, 5) = 8 \times 10^{-5}$ (L, U, df)

Nov 18-9:37 AM

Find the area on each side of $\chi^2 = 12$ with df = 9, then multiply smaller area by 2.

$\chi^2cdf(0,12,9) =$ .787

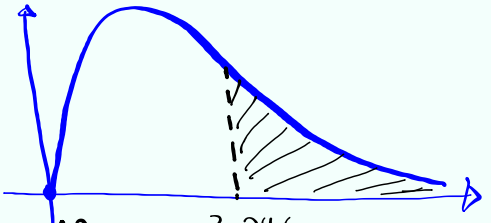
$\chi^2cdf(12,E99,9) =$ .213



$2*(.213) =$ .426

Nov 18-9:41 AM

Find $P(F>3.246)$ with Ndf = 4 & Ddf = 21.

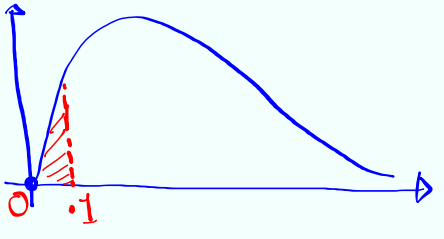


fcdf(L, U, Ndf, Ddf) fcdf(3.246, E99, 4, 21) = .032

Find $P(F<.1)$ with Ndf = 3, Ddf = 20.

fcdf(0, .1, 3, 20)

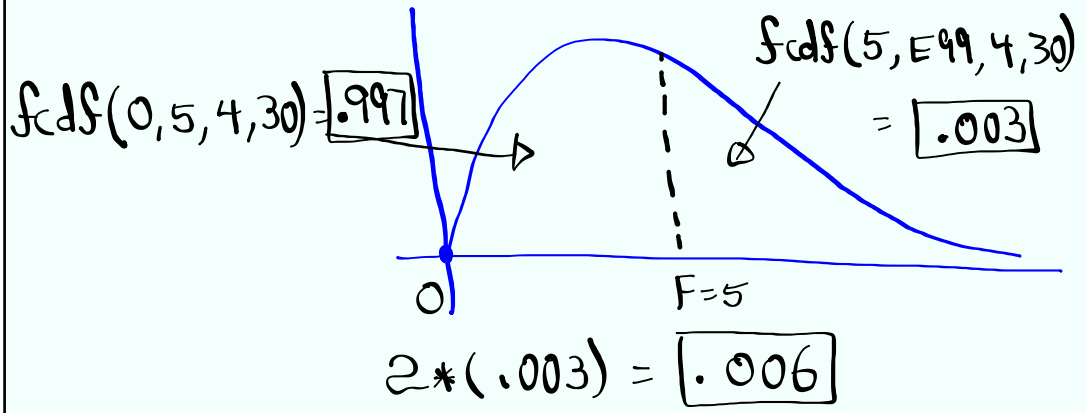
≈ .041



Nov 18-9:46 AM

Find the area on each side of $f=5$ with $Ndf=4$ & $Ddf=30$.

Multiply smaller area by 2.



$2*(.003) = .006$

Nov 18-9:56 AM