Statistics
Fall 2022
Lecture 13

Feb 19-8:47 AM

Class QZ 13

Given: $n = 185$, $\hat{p} = .4$

$x = n\hat{p}$

$= 185(.4) = 74$ ✓

Find Conf. interval for the pop. proportion.

Give the margin of error.

NO C-level:

Use .95 ✓

1-PropZInt

$.329 < p < .471$ ✓

$E = \frac{.471 - .329}{2} = .071$ ✓

Nov 15-9:06 PM

SG 25

Testing one Population Proportion:

$H_0: p = p_0$ | $H_0: p \le p_0$ | $H_0: p \ge p_0$

$H_1: p \ne p_0$ | $H_1: p > p_0$ | $H_1: p < p_0$

TTT | RTT | LTT

Always identify the claim and testing Type.

For C.V. z use invNorm

Drawing, labeling, shading, full TI Command

For CTS (Computed Test statistic) & P-value

use 1-Prop Z Test

Use testing chart to determine the validity of H_0 & H_1.

Final Conclusion must be about the claim.

Reject the claim OR FTR the claim

Nov 22-6:53 PM

Given: $n = 180$, $x = 50$, $H_0: p = .25$

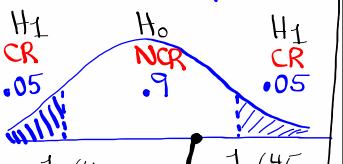
claim is H_0, $\alpha = .1$

Test the claim.

$H_0: p = .25$ claim

$H_1: p \ne .25$ TTT

CV z TTT $\alpha = .1$



z = invNorm(.95, 0, 1)

CTS $z = .861$

P-value $P = .389$

1-Prop Z Test

$P_0: .25$ H_0

$x = 50$

$n = 180$

Prop $\ne P_0$ H_1

Calculate

CTS is in NCR ⇒ H_0 Valid ⇒ H_1 invalid

P-value $>$ α

.389 .1

Valid claim ⇒

FTR the claim

Nov 22-7:01 PM

CNN claims that at most 40% of all voters voted in the last midterm elections. → $P \leq .4$

I randomly selected 195 voters ($n=195$), and 85 of them ($x=85$) voted in the last midterm elections.

Use $\alpha=.02$ to test the claim.

$H_0: P \leq .4$ claim

$H_1: P > .4$ RTT

CV Z RTT $\alpha=.02$

H_0 NCR .98 | H_1 CR .02

2.054

$Z = \text{invNorm}(.98, 0, 1)$

CTS $Z = 1.023$

P-value $P = .153$

1-PropZTest

$P_0: .4$ H_0

$x=85$

$n=195$

Prop $> P_0$ H_1

CTS is in NCR. → H_0 Valid

P-value $> \alpha$ (.153 > .02) → H_1 invalid

Valid claim

FTR the claim

Nov 22-7:11 PM

The College claims that less than 10% of all students Smoke. $P < .1$

I took a Sample of 240 Students ($n=240$) and 9% of them ($\hat{P}$) were Smokers → $x = n\hat{P} = 240(.09) \Rightarrow x=22$

Test the claim. → No α ⇒ use .05

$H_0: P \geq .1$

$H_1: P < .1$ claim, LTT

CV Z LTT $\alpha=.05$

H_1 CR .05 | H_0 NCR .95

−1.645

$Z = \text{invNorm}(.05, 0, 1)$

CTS $Z = -.430$

P-value $P = .333$ ✓

1-PropZTest

$P_0: .1$ H_0

$x=22$

$n=240$

Prop $< P_0$ H_1

CTS is in NCR. → H_0 Valid

P-value $> \alpha$ ⇒ H_1 invalid

Invalid claim

Reject the claim

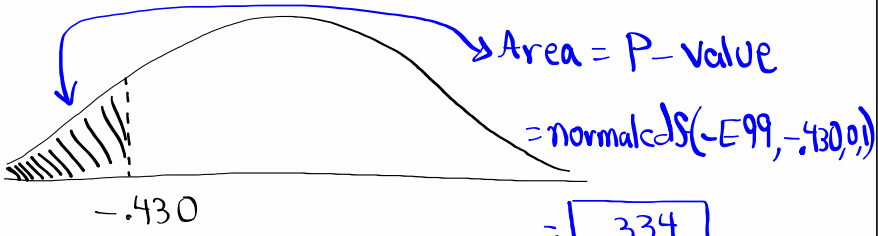
Nov 22-7:22 PM

What is P-Value?

P-value is the total area of tails marked by CTS.

When doing TTT, find nearest tail area, then multiply by 2.

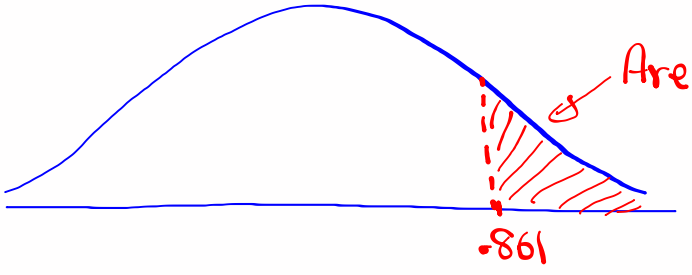
CTS $Z = -.430$, LTT, find P-value.



$= .334$

Nov 22-7:34 PM

CTS $Z = .861$, TTT, find p-value.



P-value = 2 * normalcdf(.861, E99, 0, 1) = .389

SG 25 ✓

Nov 22-7:38 PM

SG 26

Testing one population mean:

$H_0: \mu = \mu_0$	$H_0: \mu \geq \mu_0$	$H_0: \mu \leq \mu_0$
$H_1: \mu \neq \mu_0$	$H_1: \mu < \mu_0$	$H_1: \mu > \mu_0$
TTT	LTT	RTT

Always identify the claim & testing type

Case I: σ Known	Case II: σ unknown
CV z invNorm	CV t invT $df = n-1$
CTS z	CTS t
P-Value P $\Rightarrow$ Z-Test	P-Value P $\Rightarrow$ T-Test

Use testing chart to determine the validity of H_0 & H_1.

Final Conclusion must be about the claim.

Reject the claim OR FTR the claim

Nov 22-7:56 PM

Given $n=40$, $\bar{x}=85$, $\sigma=12$, $H_0: \mu = 80$

claim is H_0, $\alpha = .04$

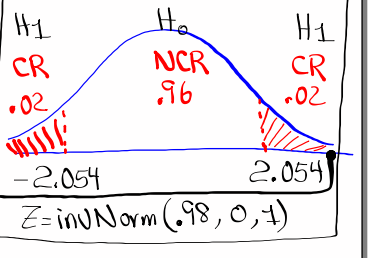
Test the claim.

σ Known $\Rightarrow$ Case I

$H_0: \mu = 80$ claim

$H_1: \mu \neq 80$ TTT

CV z TTT $\alpha = .04$



CTS $z = 2.635$

P-value $P = .008$

Z-Test

inpt: Stats

$\mu_0: 80$ H_0

$\sigma = 12$

$\bar{x} = 85$

$n = 40$

$\mu \neq \mu_0$ H_1

CTS is in CR H_0 invalid

P-Value $\leq \alpha \Rightarrow H_1$ valid

Invalid claim

Reject the claim

Nov 22-8:03 PM

Given: $n=10$, $\bar{x}=82$, $S=7.5$, $H_1: \mu \neq 85$

claim is H_1, $\alpha=.1$

Test the claim

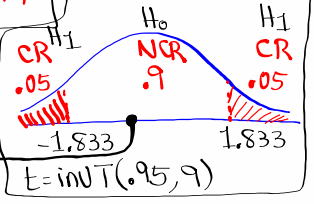
σ unknown $\Rightarrow$ Case II

$H_0: \mu = 85$

$H_1: \mu \neq 85$ claim, TTT

CV t TTT

$\alpha=.1$ $df=n-1=9$



CTS $t=-1.865$

P-value $P=.238$

T-Test

inpt: Stats

$\mu_0=85$ H_0

$\bar{x}=82$

$S=7.5$

$n=10$

$\mu \neq \mu_0$ H_1

CTS is in NCR. $\Rightarrow$ H_0 valid

P-value $>\alpha$ H_1 invalid

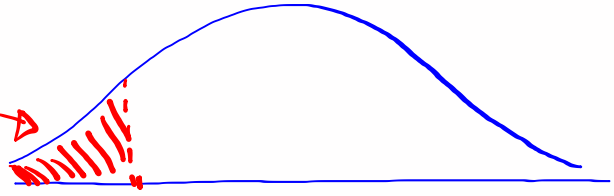
Invalid claim

Reject the claim

Nov 22-8:13 PM

CTS $t=-1.265$, TTT, $df=9$

Find P-value



P-value $=2*$ Area

$=2*tcdf(-E99,-1.265,9)=.238$

Nov 22-8:24 PM

College claims the mean age of all students is less than 32.5 Yrs. $\mu < 32.5$

I randomly selected 38 students, their mean age was 31.4 Yrs. $n=38$, $\bar{x}=31.4$

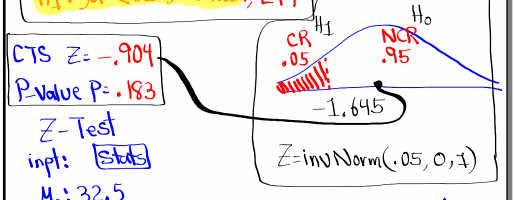
It is known that Standard deviation of ages of all students is 7.5 Yrs $\sigma = 7.5$

Test the claim. → NO α ⇒ use .05 σ known ⇒ Case I

$H_0: \mu \geq 32.5$

$H_1: \mu < 32.5$ claim, LTT

CV z LTT $\alpha = .05$



CTS $z = -.904$

P-value P-.183

Z-Test

inpt: Stats

$\mu_0: 32.5$

$\sigma: 7.5$

$\bar{x}=31.4$

$n=38$

$\mu < \mu_0$

CTS is in NCR ⇒ H_0 valid

P-value $> \alpha$ ⇒ H_1 invalid

Invalid claim

Reject the claim

Nov 22-8:27 PM

Math dept. claims the mean of all final exams is at least 80. $\mu \geq 80$

I took a Sample of 20 final exams, and the mean was 79 with Standard deviation 10. $n=20$, $\bar{x}=79$, $S=10$

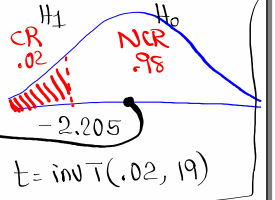
Test the claim at $\alpha = .02$

σ unknown ⇒ Case II

$H_0: \mu \geq 80$ claim

$H_1: \mu < 80$ LTT

CV t LTT $\alpha = .02$ $df = n-1 = 19$



CTS $t = -.894$

P-value P=.191

T-Test

$\mu_0 = 80$

$\bar{x} = 78$

$S = 10$

$n = 20$

$\mu < \mu_0$

CTS is in NCR ⇒ H_0 valid

P-value $> \alpha$ ⇒ H_1 invalid

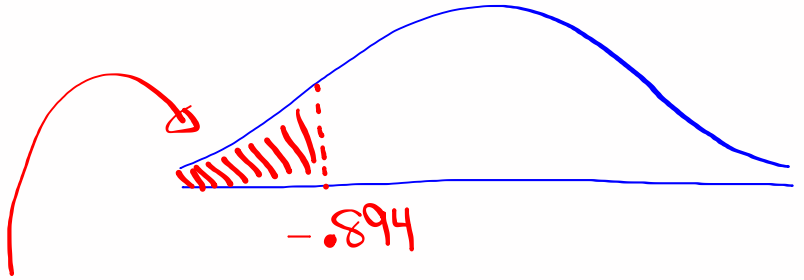
Valid claim

FTR the claim

Nov 22-8:39 PM

CTS $t = -.894$, LTT, $df = 19$

Find P-value.



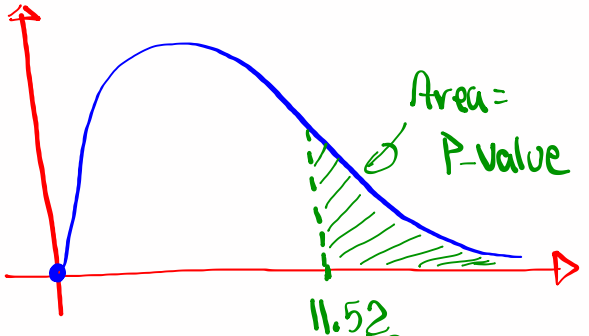
P-value = Area = tcdf(-E99, -.894, 19) = .191

Nov 22-8:50 PM

Given CTS $\chi^2 = 11.52$ RTT $df = 8$

Find p-value

2nd VARS



L U

P-value = χ^2cdf(11.52, E99, 8) = .174

Nov 22-9:05 PM

Given CTS $\chi^2 = 7.875$, LTT, df = 14

Find P-Value

P-Value = Area

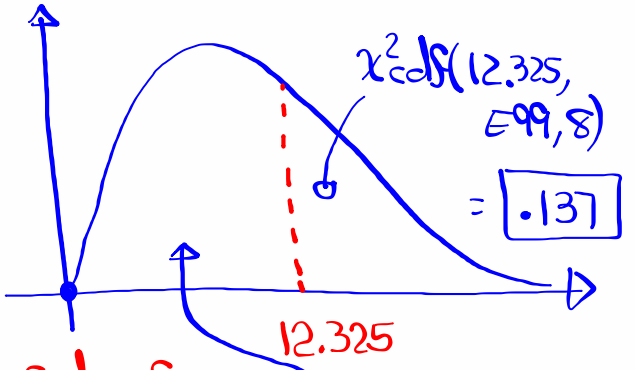
$= \chi^2cdf(0, 7.875, 14) = .104$

Nov 22-9:08 PM

Given CTS $\chi^2 = 12.325$, df = 8, TTT

Find P-Value.

Since this is TTT and no Symmetry,



Find area on each Side of CTS, then multiply Smaller area by 2.

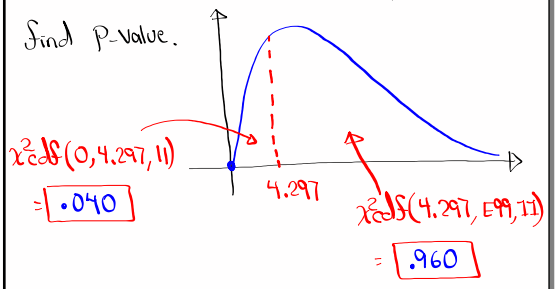
P-Value = 2 * Smaller area

$= 2 * (.137) = .274$

Nov 22-9:11 PM

Given CTS $\chi^2 = 4.297$, TTT, df = 11

Find P-value.



P-value = 2 * Smaller area
= 2 * (.040) = .080

Work on SG 26 & 27

Look for my email for notes & video to finish them.

Nov 22-9:15 PM