Statistics

Fall 2022

Lecture 26

Feb 19-8:47 AM

CNN claims that less than 40% of all voters in CA are in support of legal abortion. → $p < .4$ H_1

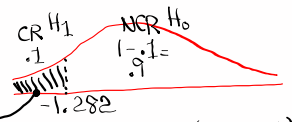
In a survey of 285 CA voters, 36% of them were in favor of legal abortion. If decimal → Round up. $n = 285$, $\hat{p} = .36$ ⇒ $x = n\hat{p}$, $x = 103$

Use this survey to test the claim at $\alpha = .1$.

C.V. Z $\alpha = .1$ LTT

$H_0: p \geq .4$

$H_1: p < .4$ claim, LTT



CTS $Z = -1.330$

P-Value $P = .092$ ✓

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

1-PropZTest

$p_0: .4$

$x = 103$

$n = 285$

Prop < p_0

Reject it.

CTS is in CR ⇒ H_0 invalid ⇒ H_1 valid

P-Value $\leq \alpha$ ⇒ H_1 valid

.092 ≤ .1

Valid claim ⇒ FTR the claim

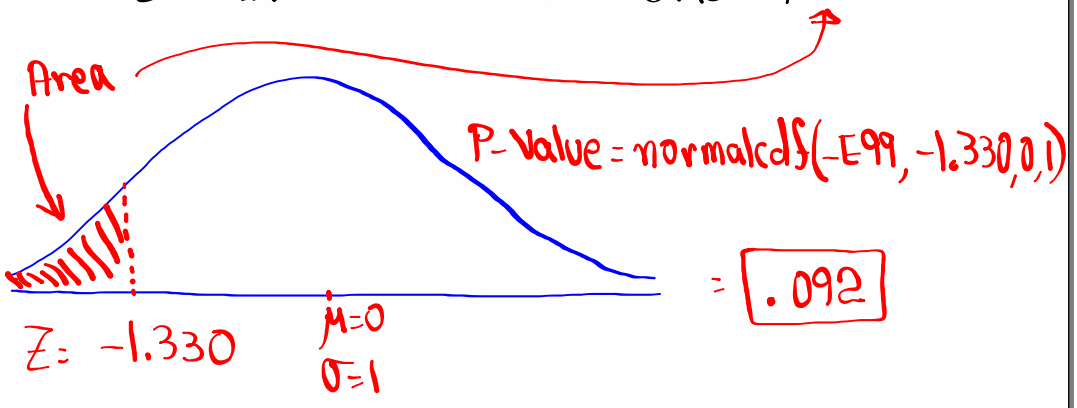
If we change α to .05, .04, .01 then P-Value > α ⇒ H_1 invalid

Invalid claim

Reject the claim

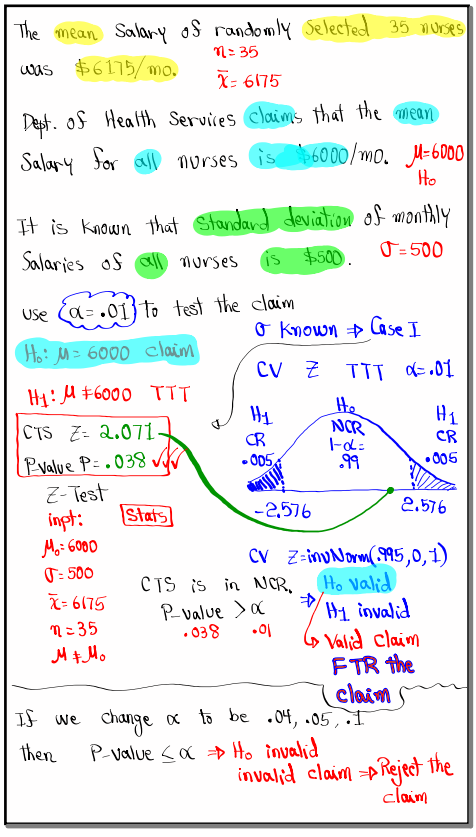
Dec 8-6:00 AM

CTS $Z = -1.330$ LTT Find P-value.



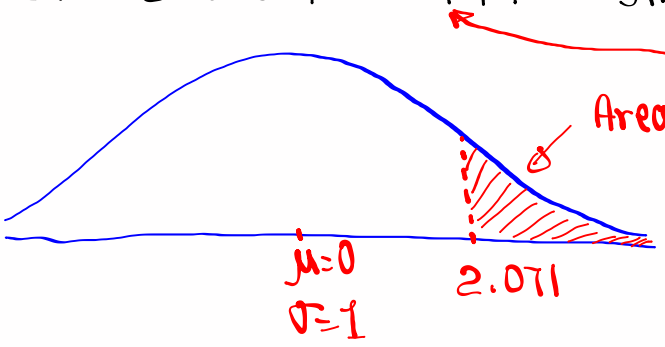
If this was a TTT ⇒ then we multiply by 2.

Dec 8-6:16 AM



Dec 8-6:19 AM

CTS $Z = 2.071$ TTT find p-value.



P-value = 2 * normalcdf(2.071, E99, 0, 1) = .038

Dec 8-6:38 AM

SG 26

Testing One Population Mean:

$H_0: \mu = \mu_0$	$H_0: \mu \le \mu_0$	$H_0: \mu \ge \mu_0$
$H_1: \mu \ne \mu_0$	$H_1: \mu > \mu_0$	$H_1: \mu < \mu_0$
TTT	RTT	LTT

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 P-value P ⇒ Z-Test input: Stats	CTS t P-value P ⇒ T-Test input: Stats

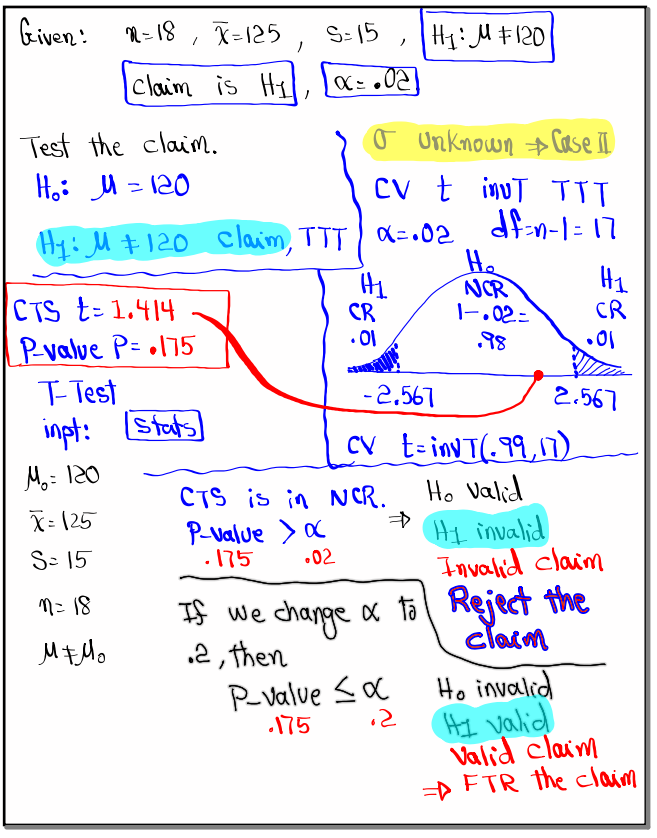
Proceed with testing chart

Make final conclusion about the claim

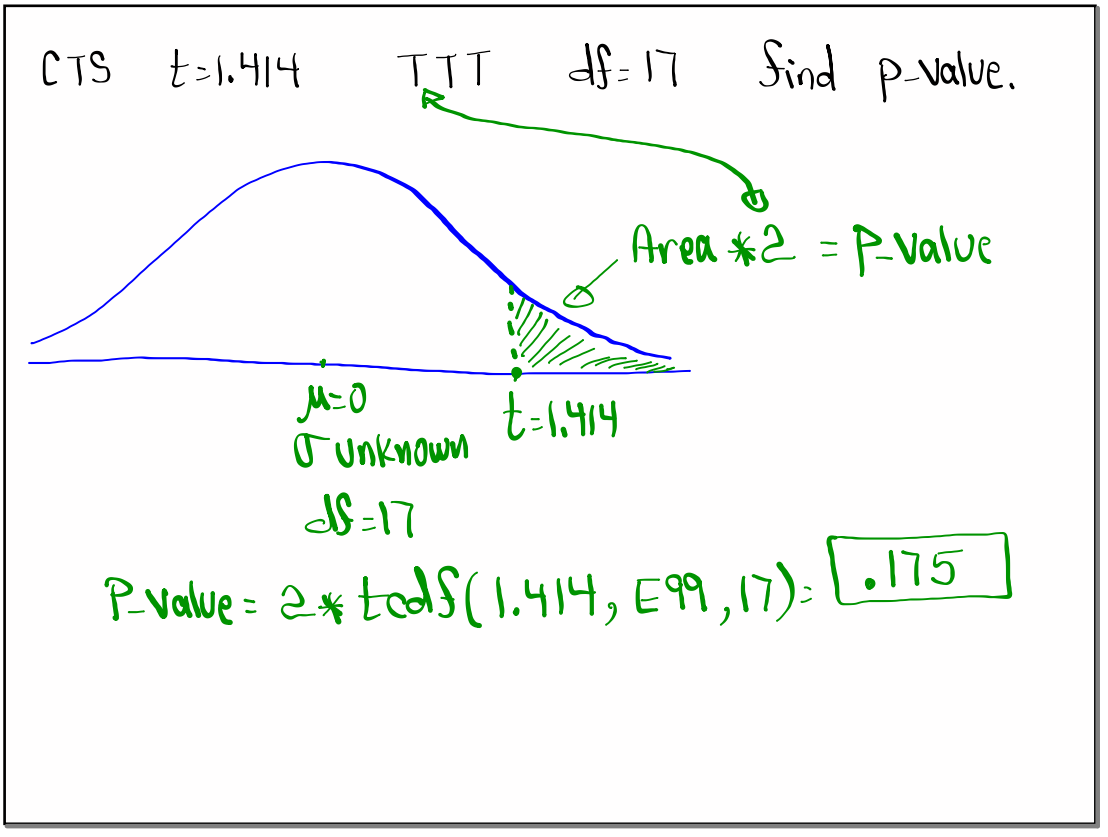
Reject the claim OR FTR the claim

(Invalid claim) (Valid claim)

Dec 7-7:21 AM



Dec 8-6:45 AM



Dec 8-7:17 AM

I randomly selected 10 exams, the mean score was 84 with standard deviation 8.

$n=10$
$\bar{x}=84$
$s=8$

use $\alpha=.02$ to test the claim that the mean of all exams is 80.

$\mu=80$ H_0

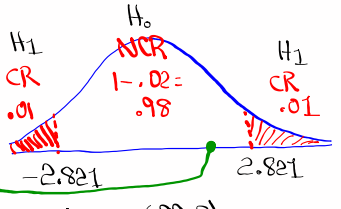
$H_0: \mu=80$ claim
$H_1: \mu\neq 80$ TTT

σ unknown $\Rightarrow$ Case II

CV t invT TTT
$\alpha=.02$ $df=n-1=9$

CTS $t=1.581$
Pvalue $P=.148$

T-Test
inpt: Stats
$\mu_0=80$
$\bar{x}=84$
$s=8$
$n=10$
$\mu\neq\mu_0$



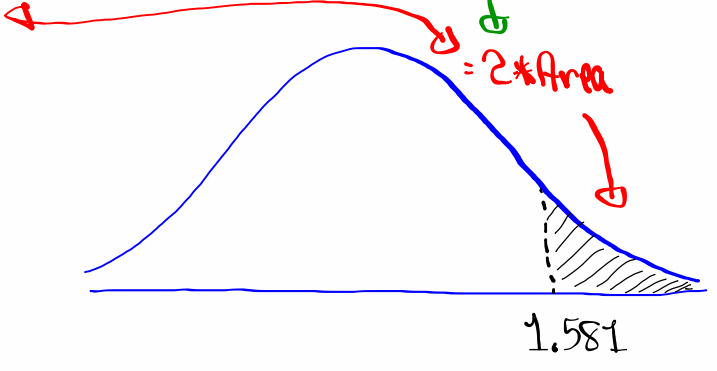
CV $t=$invT(.99,9)

CTS is in NCR $\Rightarrow$ H_0 valid
P-value $>\alpha$ H_1 invalid
Valid claim
FTR the claim

Dec 8-7:21 AM

CTS $t=1.581$ TTT $df=9$

find p-value.



P-value = 2*tcdf(1.581, E99, 9) = .148

Dec 8-7:33 AM

I randomly selected 12 students, here are their ages: ($n=12$)

28	32	40	18
20	25	45	19
24	30	35	27

Find
1) $\bar{x} \approx 29$
2) $s \approx 8$
} Round to a whole #

Use $\alpha = .02$ to test the claim that the mean age of all students is below 30 yrs.

H_0: $\mu \geq 30$

H_1: $\mu < 30$ claim, LTT ($\mu < 30$ H_1)

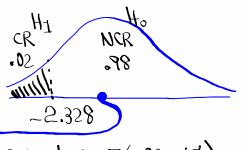
σ unknown $\Rightarrow$ Case II

CV t LTT $\alpha = .02$

$df = n - 1 = 11$

CTS $t = -.433$

P-value $P = .337$



T-Test
inpt: Stats
$\mu_0 = 30$
$\bar{x} = 29$
$s = 8$
$n = 12$
$\mu < \mu_0$

CV $t = invT(.02, 11)$

CTS is in NCR. H_0 valid

P-value $> \alpha$ $\Rightarrow$ H_1 invalid

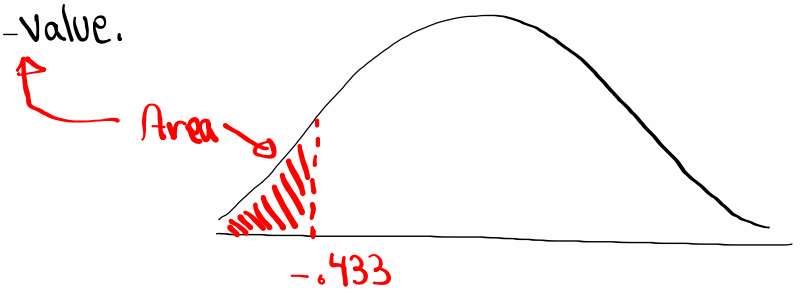
Invalid claim

Reject the claim

Dec 8-7:37 AM

CTS $t = -.433$ LTT $df = 11$

Find p-value.



P-value = $tcdf(-E99, -.433, 11) = .337$

Dec 8-7:53 AM

CTS $\chi^2 = 12.875$ RTT $df = 8$ Find P-Value

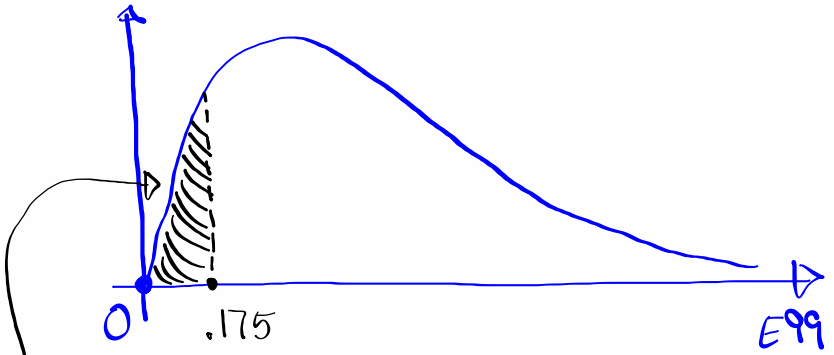
chi-Square

P-value = χ^2cdf(12.875, E99, 8) = .116

(L, U, df)

Dec 8-7:57 AM

CTS $\chi^2 = .175$ LTT $df = 9$ Find P-value.



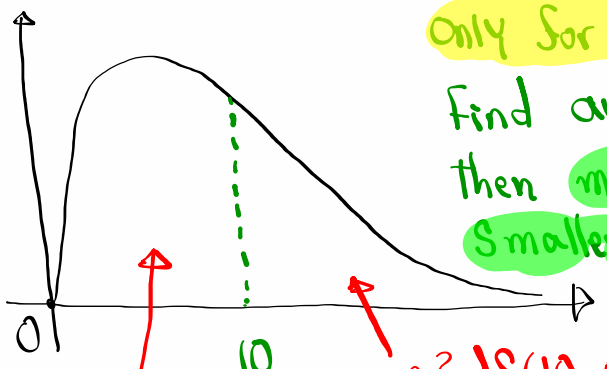
P-value = χ^2cdf(0, .175, 9) = 3.1×10^{-7}

Dec 8-8:02 AM

CTS $\chi^2 = 10$ TTT $df = 7$ Find p-value.

Only for TTT:

Find area on each side, then multiply the smaller area by 2.



$\chi^2cdf(10, E99, 7) =$ .189

Total = 1

$\chi^2cdf(0, 10, 7) =$ .811

P-value = 2 * Smaller area = 2 * .189 = .378

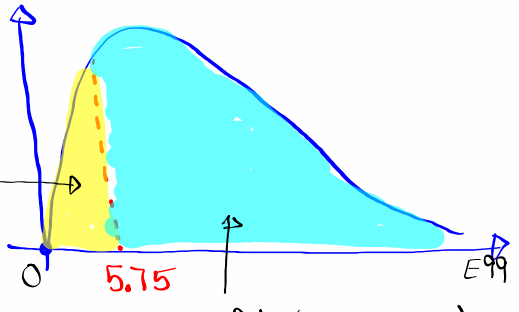
Dec 8-8:06 AM

Given CTS $\chi^2 = 5.75$ TTT $df = 9$

Find p-value.

$\chi^2cdf(0, 5.75, 9)$

= .235



$\chi^2cdf(5.75, E99, 9)$

= .765

P-value = 2 * Smaller area

= 2 * .235 = .470

Work on SG 26 & 27.

Expect note and video so you can finish SG 26 and SG 27.

Dec 8-8:11 AM