Statistics

Lecture 21

Feb 19-8:47 AM

CNN claimed that about 10% of Americans care about the Royal family.

I surveyed 225 Americans, and 12% of them cared about the Royal family.

$n=225$

$x=225(.12)=27$

Test the claim.

No $\alpha \rightarrow \alpha=.05$

$H_0: P=.1$ claim

$H_1: P\neq .1$ TTT

CV Z TTT $\alpha=.05$

H_1 CR .025 | H_0 NCR .95 | H_1 CR .025

-1.960 $\mu=0$ $\sigma=1$ 1.960

CTS $Z=1$

P-Value $P=.317$

1-PropZTest

$P_0: .1$

$x: 27$

$n: 225$

Prop $\neq P_0$

$Z=\text{invNorm}(.975,0,1)$

CTS is in NCR

P-Value $>\alpha$

H_0 valid

H_1 invalid

Valid claim $\rightarrow$ FTR the claim

Apr 29-6:56 PM

Testing one Population Mean:

$H_0: \mu =$ $H_0: \mu \leq$ $H_0: \mu \geq$

$H_1: \mu \neq$ $H_1: \mu >$ $H_1: \mu <$

TTT RTT LTT

Case I: σ Known

CV z

Drawing, labeling, Shading, and TI Command required

CTS z → Z-Test

P-Value P input: Stats

use Testing Chart to determine the validity of H_0 & H_1.

H_0 valid ⟷ H_1 invalid

H_0 invalid ⟷ H_1 valid

Draw final Conclusion about the claim

Reject the claim OR FTR the claim

Apr 29-7:08 PM

Dept. claims the mean of all exams is 82. $\mu = 82$ H_0

I randomly selected 30 exams, and the mean was 88. $n = 30$ $\bar{x} = 88$

It is known that standard deviation of all exam Scores is 10. $\sigma = 10$

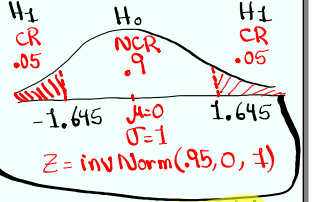
use $\alpha = .1$ to test the claim.

$H_0: \mu = 82$ claim

$H_1: \mu \neq 82$ TTT

σ Known

CV z TTT $\alpha = .1$



$z = \text{invNorm}(.95, 0, 1)$

CTS $z = 3.286$

P-Value $P = .001$

Z-Test

Stats

input:

$\mu_0: 82$ H_0

$\sigma = 10$

$\bar{x} = 88$

$n = 30$

$\mu \neq \mu_0$ H_1

CTS is in CR H_0 invalid

P-value $\leq \alpha$ H_1 Valid

Invalid claim

Reject the claim

Apr 29-7:17 PM

Dept. of Health claims the mean Salary of all nurses is at least \$6500/mo.

$\mu \geq 6500$ H_0

LA Times Collected data from 32 nurses, their mean Salary was \$6250/mo. $n=32$ $\bar{x}=6250$

It is known that standard deviation of Salaries of all nurses is \$300/mo. $\sigma=300$

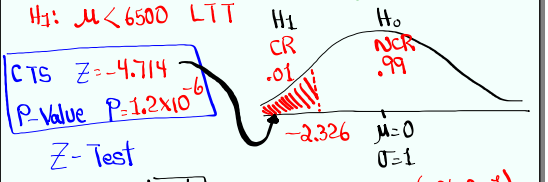
Test the claim at $\alpha=.01$

H_0: $\mu \geq 6500$ claim

H_1: $\mu < 6500$ LTT

σ Known

CV Z LTT $\alpha=.01$



CTS $Z=-4.714$

P-Value $P=1.2\times10^{-6}$

Z-Test

inpt: Stats

μ_0: 6500 H_0

σ: 300

$\bar{x}$: 6250

n: 32

$\mu < \mu_0$ H_1

$Z=$ invNorm(.01, 0, 1)

CTS is in CR { H_0 invalid; H_1 valid

P-value $\leq \alpha$ { H_1 valid

Invalid claim

Reject the claim

Apr 29-7:32 PM

Testing one Population Mean:

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

Case I: σ Known	Case II: σ unknown
CV Z	CV t $df=n-1$
Drawing, labeling, Shading, and TI Command required	Drawing, labeling, Shading, and TI Command required
CTS Z P-Value P → Z-Test inpt: Stats	CTS t P-Value P → T-Test inpt: Stats

use Testing Chart to determine the validity of H_0 & H_1.

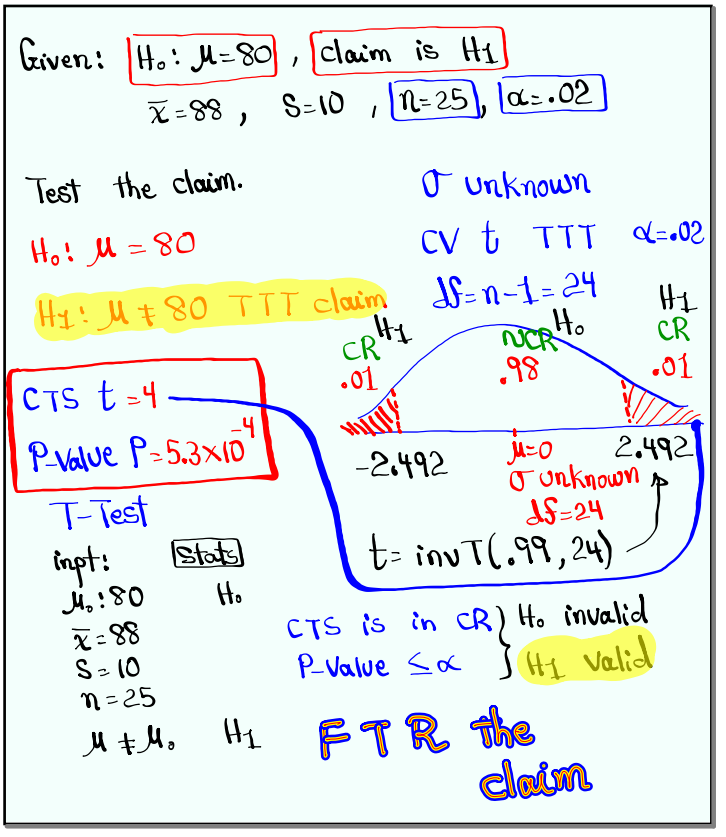
H_0 valid ⟷ H_1 invalid

H_0 invalid ⟷ H_1 valid

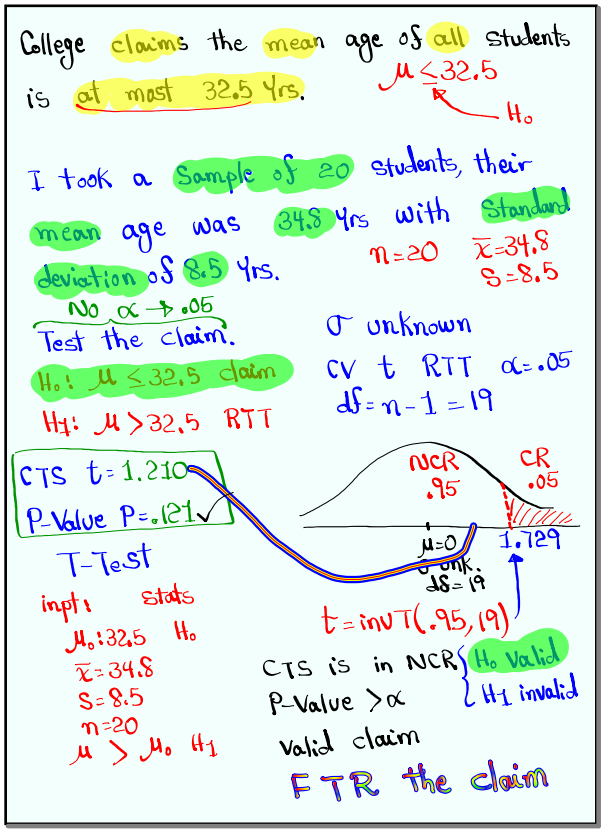
Draw final Conclusion about the claim

Reject the claim OR FTR the claim

Apr 29-7:08 PM



Apr 29-7:50 PM



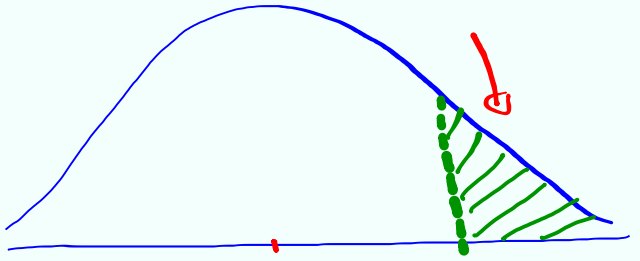
Apr 29-8:01 PM

CTS $t = 1.210$

RTT

$df = 19$

find p-value.



P-Value = $tcdf(1.210, E99, 19)$

$\approx$ .121

Apr 29-8:16 PM

12 exams were randomly selected. → Sample

Here are the Scores:

75	82	100	90
68	70	96	80
100	98	85	78

Find $\bar{x} \approx 85$, $s \approx 12$ (Round to whole #)

Test the claim that the mean of exams is above 82. $\alpha = .05$

$\mu > 82$ ← H_1

$H_0: \mu \leq 82$

$H_1: \mu > 82$ claim, RTT

σ unknown

CV t RTT $\alpha = .05$

$df = n - 1 = 11$

CTS $t = .866$

P-Value $P = .202$

T-Test

inpt: Stats

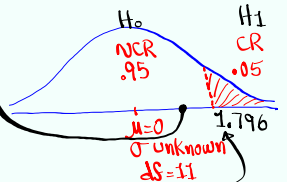
$\mu_0: 82$

$\bar{x} = 85$

$s = 12$

$n = 12$

$\mu > \mu_0$



t=invT(.95, 11):

CTS is in NCR ⇒ H_0 valid

P-Value > α ⇒ H_1 invalid

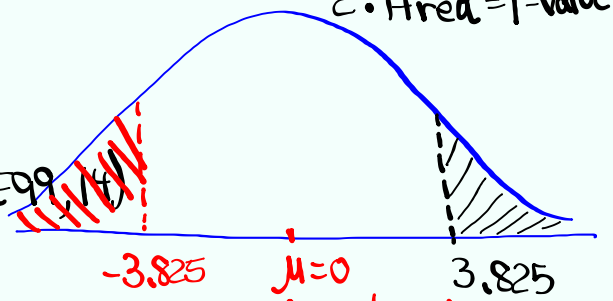
Invalid claim → Reject the claim

Apr 29-8:20 PM

Given cts $t = 3.825$ $df = 14$, TTT

Find P-Value.

2. Area = P-Value



P-Value = 2·tcdf(3.825, E99, 14)

$\approx$ .002

SG 23, 24, & 25

Apr 29-8:35 PM