Statistics
Spring 2023
Lecture 49

Feb 19-8:47 AM

SG 25

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, and type of test.

Case I: σ Known	Case II: σ unknown
C.V. z invNorm	C.V. t invT $df = n-1$
CTS z P-value P Z-Test	CTS t P-value P T-Test
CTS Formula $z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$ TI → normalcdf	CTS Formula $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$ TI → tcdf, $df = n-1$

Drawing, labeling, shading, TI Command required

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

Draw final Conclusion for the claim

Reject the claim when claim is invalid **OR FTR the claim** when claim is valid

May 10-7:15 AM

Given $n=35$, $\bar{x}=84$, $\sigma=12$, $H_0: \mu=80$

claim is H_1, $\alpha=.02$

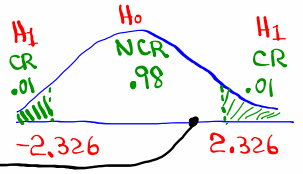
Test the claim.

Since σ is given, we are in Case I.

CV Z TTT $\alpha=.02$

$H_0: \mu=80$

$H_1: \mu \neq 80$ TTT, claim



CTS $Z=1.972$

P-value $P=.049$

Z-Test

Inpt: Stats

$\mu_0: 80$ H_0

$\sigma: 12$

$\bar{x}: 84$

$n: 35$

$\mu \neq \mu_0$ H_1

Calculate

$Z=$invNorm(.99,0,1)

CTS is in NCR

P-value $>$ α

.049 .02

H_0 valid, H_1 invalid

Invalid claim

Reject the claim

May 11-7:28 AM

Given $H_0: \mu \leq 128$, claim is H_0 $\alpha=.05$

$n=15$, $\bar{x}=130$, $s=20$

Test the claim.

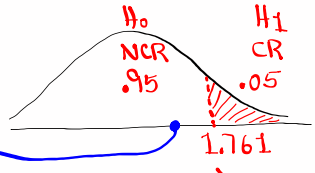
$H_0: \mu \leq 128$ claim

$H_1: \mu > 128$ RTT

σ is unknown, we are in Case II.

CV t RTT $\alpha=.05$

$df=n-1=14$



CTS $t=.387$

P-value $P=.352$

T-Test

Inpt: STATS

$\mu_0: 128$ H_0

$\bar{x}=130$

$s=20$

$n=15$

$\mu > \mu_0$ H_1

Calculate

$t=$invT(.95,14)

CTS is in NCR

H_0 valid & H_1 invalid

P-value $>$ α

.352 .05

Valid claim

FTR the claim

May 11-7:40 AM

The College claims that the mean age of all students is at most 32 yrs.

$\mu \leq 32$

I took a Sample of 25 students and their mean age was 33.5 yrs. $n=25$ $\bar{x}=33.5$

It is known that Standard deviation of ages of all students is 8.5 yrs. $\sigma=8.5$

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

$H_0: \mu \leq 32$ claim

$H_1: \mu > 32$ RTT

Since σ is known, we are in Case I.

CV z invNorm RTT $\alpha=.1$

CTS $z=.882$

P-value $P=.189$

Z-Test

Inpt: Stats

$\mu_0: 32$ H_0

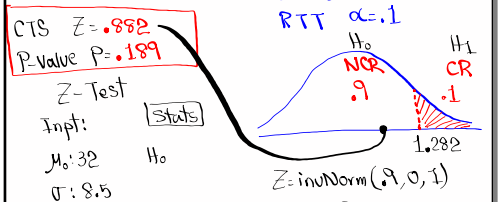
$\sigma: 8.5$

$\bar{x}: 33.5$

$n: 25$

$\mu > \mu_0$ H_1

Calculate



CTS is in NCR

H_0 valid, H_1 invalid

P-value > α

.189 > .1

Valid claim

FTR the claim

May 11-7:51 AM

Math department claims the mean score of all final exams is 80. $\mu=80$ (H_0)

I took a Sample of 10 final exams, and their mean score was 78 with Standard deviation of 12. $n=10$ $\bar{x}=78$ $s=12$

Test the claim. No α → use .05

$H_0: \mu=80$ claim

$H_1: \mu \neq 80$ TTT

Since σ is unknown, we are in Case II.

CV t TTT $\alpha=.05$

$df=n-1=9$

CTS $t=-.527$

P-value $P=.611$

T-Test

inpt: Stats

$\mu_0=80$ H_0

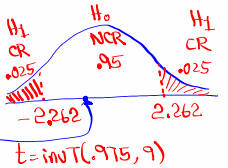
$\bar{x}=78$

$s=12$

$n=10$

$\mu \neq \mu_0$ H_1

Calculate



CTS is in NCR

H_0 valid & H_1 invalid

P-value > α

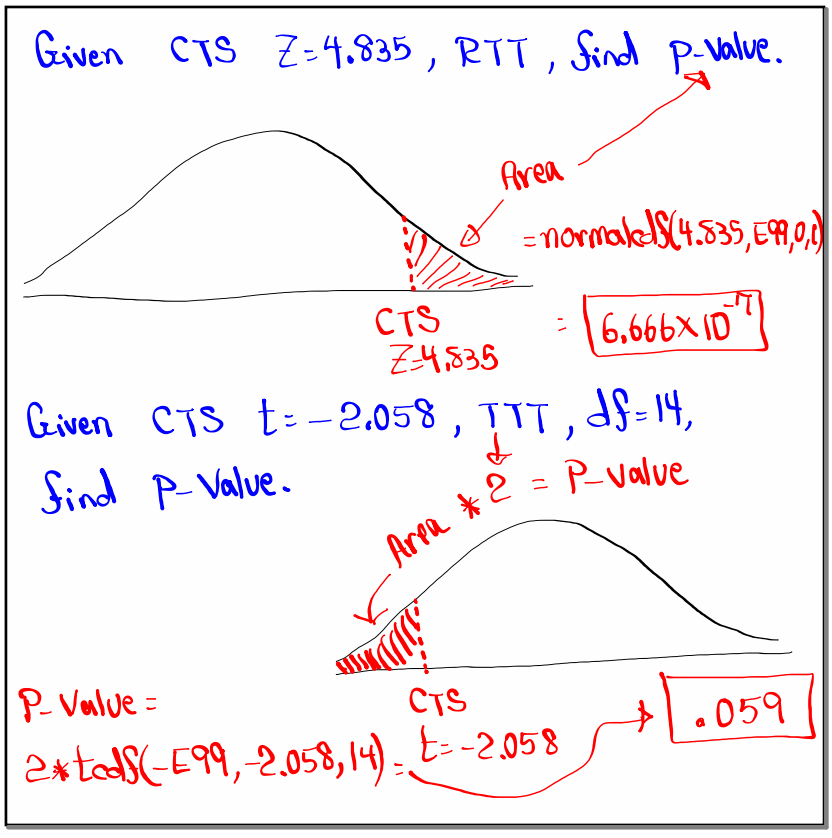
.611 > .05

Valid claim

FTR the claim

Sec 25 & Sec 26

May 11-8:06 AM


Given CTS Z=4.835, RTT, find p-value.
Area
=normalcdf(4.835,E99,0,1)
CTS
Z=4.835
= 6.666x10^-7
Given CTS t=-2.058, TTT, df=14,
find p-value.
Area *2 = P-value
P-Value =
2*tcdf(-E99,-2.058,14) =
CTS
t=-2.058
.059

May 11-8:22 AM