Statistics

Fall 2022

Lecture 25

Feb 19-8:47 AM

Testing Population Proportion: SG 25

$H_0: p = p_0$	$H_0: p \geq p_0$	$H_0: p \leq p_0$
$H_1: p \neq p_0$	$H_1: p < p_0$	$H_1: p > p_0$
TTT	LTT	RTT

Always identify the claim & testing type.

Critical Value z use invNorm

Drawing, labeling, shading, Full TI command required

Computed Test statistic z

P-value P

STAT TESTS 1-PropZTest

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

H_0 valid $\Leftrightarrow$ H_1 invalid

H_0 invalid $\Leftrightarrow$ H_1 valid

Final Conclusion must be about the claim.

Reject the claim (claim is invalid) OR FTR the claim (claim is valid)

Dec 7-6:01 AM

Given: $n=180$, $\chi=50$, $H_0: p=.25$, Claim is H_0, $\alpha=.1$

Test the claim.

$H_0: p=.25$ claim

$H_1: p \neq .25$ TTT

CTS $Z=.861$

P-value $P=.389$ √√√

1-PropZTest

$P_0=.25$ H_0

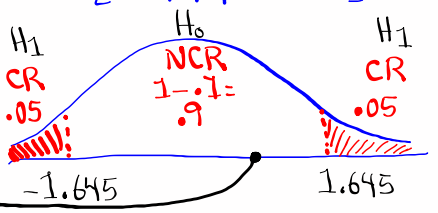
$\chi=50$

$n=180$

Prop $\neq P_0$ H_1

Calculate

CV Z TTT $\alpha=.1$



CV $Z=$ invNorm(.95, 0, 1)

CTS is in NCR. H_0 Valid

P-value $> \alpha$ ⇒ H_1 Invalid

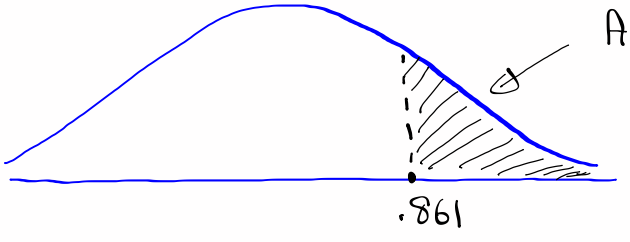
Valid claim

Fail-to-Reject the claim

Dec 7-6:13 AM

Given CTS $Z=.861$ TTT Find p-value.

Area * 2 = P-value



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

Dec 7-6:27 AM

College claims that at most 40% of all students work while taking classes. $P \leq .4$ ← H_0

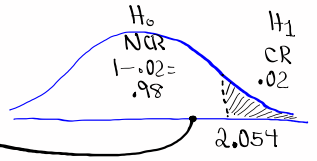
In a sample of 195 students, 85 of them were working while taking classes. $n=195$ $x=85$

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

H_0: $P \leq .4$ claim

H_1: $P > .4$ RTT

CV Z RTT $\alpha=.02$



CTS $Z=1.023$

P-value $P=.153$ √√√

1-PropZTest

$P_0: .4$ H_0

$x=85$

$n=195$

Prop $> P_0$ H_1

Calculate

CV $Z=$ invNorm$(.98,0,1)$

CTS is in NCR ⇒ P-value $> \alpha$

H_0 valid

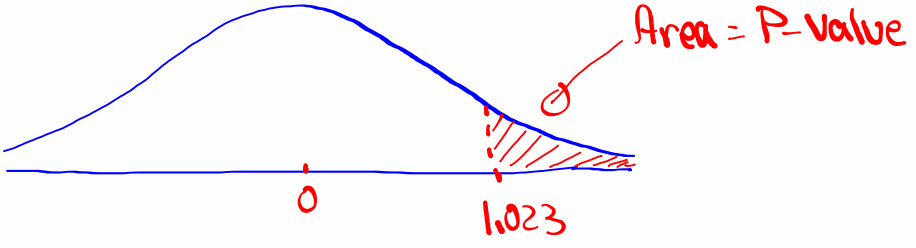
H_1 Invalid

Valid claim

Fail-to-Reject the claim

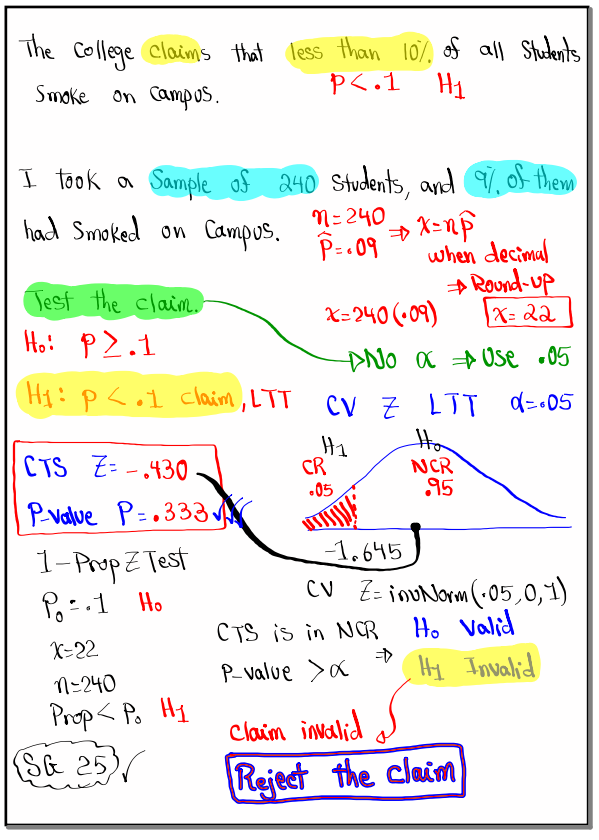
Dec 7-6:30 AM

CTS $Z=1.023$ RTT Find P-value.

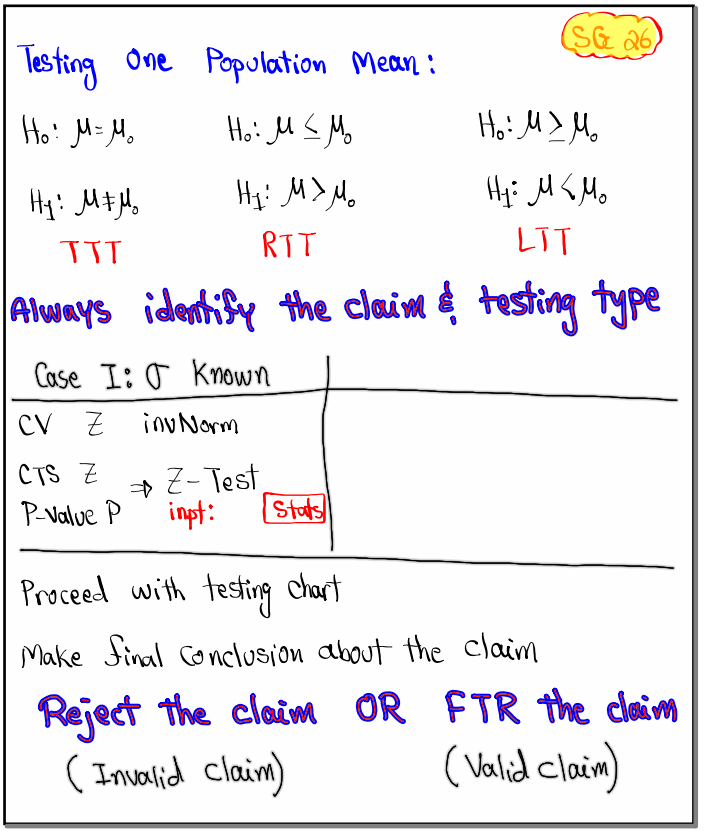


P-value = normalcdf(1.023, E99, 0, 1) = .153

Dec 7-6:45 AM



Dec 7-6:48 AM



Dec 7-7:21 AM

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

claim is H_0, $\alpha=.04$

Test the claim.

$H_0: \mu=80$ claim

$H_1: \mu \neq 80$ TTT

CTS $z=2.635$

P-value $P=.008$ √√

Z-Test

inpt: STATS

$\mu_0=80$ H_0

$\sigma=12$

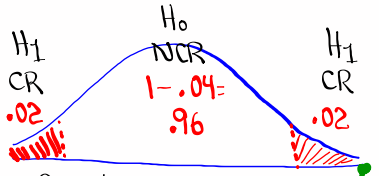
$\bar{x}=85$

$n=40$

$\mu \neq \mu_0$ H_1

σ is known

CV z TTT $\alpha=.04$



CV $z=$invNorm(.98,0,1)

CTS is in CR ⇒ H_0 invalid

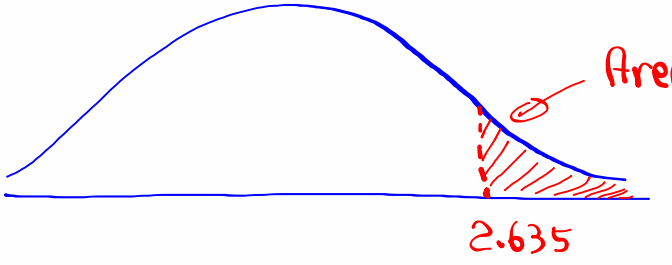
P-value $\leq \alpha$ ⇒ H_1 valid

invalid claim

Reject the claim.

Dec 7-7:30 AM

CTS $z=2.635$, TTT, find P-value.



P-value = 2 * normalcdf(2.635, E99, 0, 1) = .008

Dec 7-7:41 AM

College claims that the mean age of all students is below 32.5 yrs. $\mu < 32.5$ H_1

I randomly selected 38 students, and 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. $\sigma = 7.5$

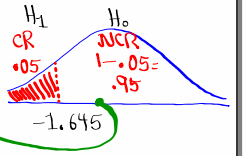
Test the claim. → NO α ⇒ use .05

H_0: $\mu \geq 32.5$

H_1: $\mu < 32.5$ claim, LTT

σ Known

CV Z LTT $\alpha = .05$



CTS $Z = -.904$

P-value $P = .183$ √√√

Z-Test

input: STATS

$\mu_0 = 32.5$ H_0

$\sigma = 7.5$

$\bar{x} = 31.4$

$n = 38$

$\mu < \mu_0$ H_1

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

CTS is in NCR ⇒ H_0 Valid

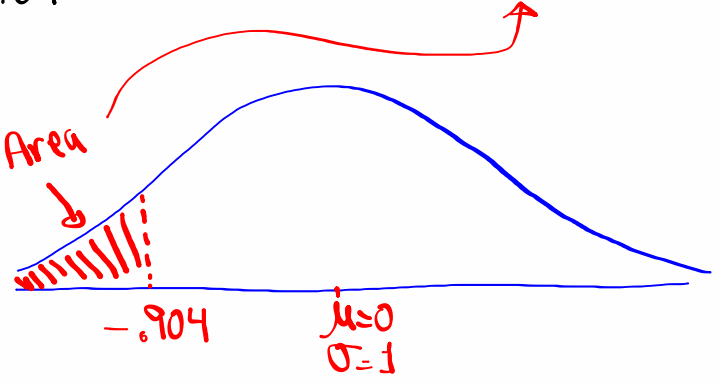
P-value $> \alpha$ ⇒ H_1 invalid

Invalid claim

Reject the claim

Dec 7-7:44 AM

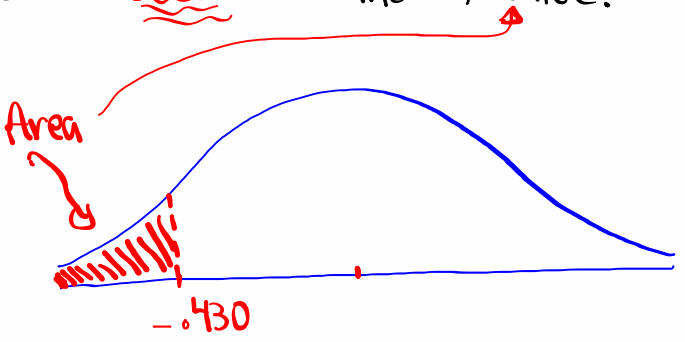
CTS $Z = -.904$ LTT find P-value



P-value = normalcdf(−E99, −.904, 0, 1) = .183

Dec 7-8:00 AM

CTS $Z = -.430$ LTT Find P-value.



P-value = normalcdf(-E99, -.430, 0, 1) = .333

Dec 7-7:04 AM

SG 26

Testing One Population Mean:

$H_0: \mu = \mu_0$	$H_0: \mu \leq \mu_0$	$H_0: \mu \geq \mu_0$
$H_1: \mu \neq \mu_0$	$H_1: \mu > \mu_0$	$H_1: \mu < \mu_0$
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 $\Rightarrow$ Z-Test inpt: Stats	CTS t P-value P $\Rightarrow$ T-Test inpt: 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