

Statistics

Lecture 20



Feb 19-8:47 AM

Testing one population Proportion : (SG 24)

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

Always identify the claim

Find Critical Value(s)
we use Z , invNorm. clearly label everything

Find Computed Test statistic CTS and P-Value P.

STAT TESTS 1-Prop Z Test

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

Draw final conclusion about the claim

Reject the claim OR Fail-to-Reject the claim

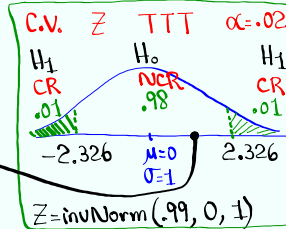
Apr 27-6:53 PM

CNN claims that 30% of all voters are in favor of tougher Gun Laws.

I surveyed 120 voters, and 40 of them were in favor of tougher gun laws.

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

$H_0: P = .3$ claim
 $H_1: P \neq .3$ TTT



CTS $Z = .797$
 P-Value $P = .426$

1-Prop Z Test

$P_0: .3$
 $x: 40$
 $n: 120$
 Prop $\neq P_0$

Calculate

Traditional Method:
 CTS is in NCR
 H_0 valid & H_1 invalid

P-value Method:
 $P\text{-value} > \alpha$
 $.426 > .02$

H_0 valid
 Valid claim

H_0 valid & H_1 invalid.

Fail-to-Reject the claim

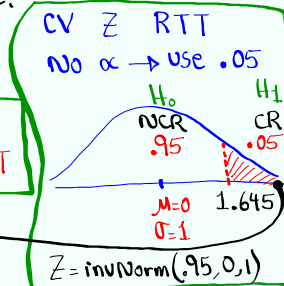
Apr 27-7:03 PM

LA Times claims that more than 60% of Dodger's Fan went to the parade.

I surveyed 200 fans, and 135 of them went to the parade.

Test the claim.

$H_0: P \leq .6$
 $H_1: P > .6$ claim, RTT



CTS $Z = 2.165$
 P-Value $P = .015$

1-Prop Z Test

$P_0: .6$
 $x: 135$
 $n: 200$
 Prop $> P_0$

Calculate

CTS is in CR.
 H_0 invalid, H_1 valid

$P\text{-value} < \alpha$
 $.015 < .05$

H_0 invalid, H_1 valid
 Valid claim

FTR the claim

Apr 27-7:20 PM

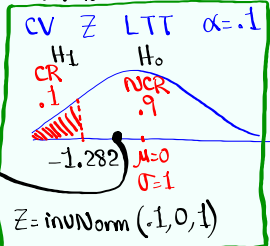
College claims that at least 35% of all students have a job while going to school.

I surveyed 150 students and 32% of them had a job.

$n = 150$
 $x = n\hat{p} = 150(.32) = 48$
 if decimal \rightarrow Round up

Use .1 significance level to test the claim.

$H_0: P \geq .35$ - claim
 $H_1: P < .35$ LTT



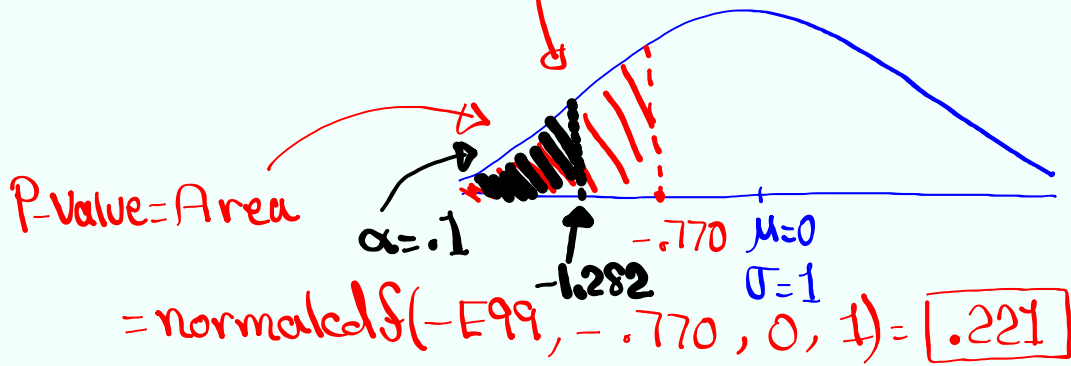
CTS $Z = -.770$
 P-Value $P = .221$ ✓

1-Prop Z Test
 $P_0: .35$ H_0
 $x: 48$
 $n: 150$
 $\text{Prop} < P_0$ H_1
 Calculate

CTS is in NCR
 $P\text{-Value} > \alpha$
 H_0 Valid & H_1 invalid
 Valid claim
FTR the claim

Apr 27-7:35 PM

CTS $Z = -.770$ LTT
 find P-Value.



Apr 27-7:50 PM

College claims that 10% of all students smoke.

I surveyed 275 students and 14% of them were smokers.

$n=275$
 $\hat{p}=.14$
 $x=n\hat{p}=275(.14)=38.5$
 if decimal \uparrow $\boxed{x=39}$

use $\alpha=.01$ to test the claim.

$H_0: p=.1$ claim
 $H_1: p \neq .1$ TTT

CV Z TTT $\alpha=.01$

CTS $Z=2.312$
 P-Value $P=.021$

1- Prop Z Test
 $P_0: .1$ H_0
 $x: 39$
 $n: 275$
 Prop $\neq P_0$ H_1

CV $Z = \text{invNorm}(.995, 0, 1)$

CTS is in NCR
 $P\text{-value} > \alpha$
 H_0 valid, H_1 invalid
 valid claim \rightarrow FTR
 I want to reject it.

Let's pick different α .

$P\text{-value} > \alpha$
 $.021 > .01$

Pick α such that
 $P\text{-value} \leq \alpha$
 $.021 \leq \alpha$
 Pick $\alpha = .03, .04, .05, \dots$

Apr 27-7:55 PM

College claims more than 60% of students like in-person classes.

A survey of 250 students, 65% of them liked in-person classes.

$n=250$
 $\hat{p}=.65$
 $x=n\hat{p}=250(.65)$
 ≈ 163

Test the claim using $\alpha=.1$.

$H_0: p \leq .6$
 $H_1: p > .6$ claim, RTT

CV Z RTT $\alpha=.1$

CTS $Z=1.678$
 P-Value $P=.047$

1- Prop Z Test
 $P_0: .6$ H_0
 $x: 163$
 $n: 250$
 Prop $> P_0$ H_1

CV $Z = \text{invNorm}(.9, 0, 1)$

CTS is in CR
 $P\text{-value} \leq \alpha$
 H_0 invalid, H_1 valid
 valid claim \rightarrow FTR
 the claim

To reject the claim
 $P\text{-value} > \alpha$ $.047 > \alpha$

choose α to be
 $.04, .03, .02, .01$

Apr 27-8:16 PM