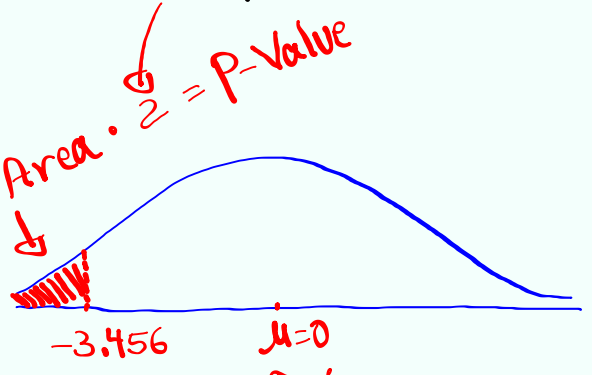
Statistics

Lecture 22

Feb 19-8:47 AM

Given CTS $Z = -3.456$ TTT

Find p-value



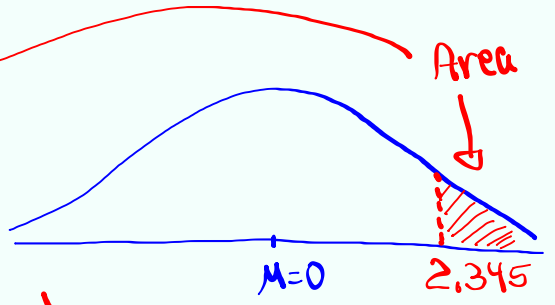
P-Value = 2 · normalcdf(-E99, -3.456, 0, 1)

$= \boxed{5.5 \times 10^{-4}}$

May 4-6:58 PM

Given CTS $t = 2.345$ RTT $df = 14$

Find P-Value.



P-Value = tcdf(2.345, E99, 14)

$\approx$ .017

σ unknown

df = 14

May 4-7:02 PM

CNN claims that at most 30% of voters blame the gas prices on Iran war. $p \leq .3$ (H_0)

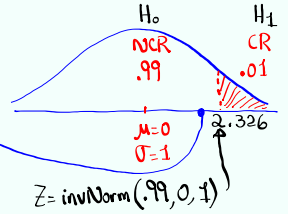
I surveyed 180 voters, and 35% of them were blaming high gas prices on the war.

$n = 180$ $x = n\hat{p} = 180(.35) = 63$ $\hat{p} = .35$

Test the claim at $\alpha = .01$.

H_0: $p \leq .3$ claim CV Z RTT $\alpha = .01$

H_1: $p > .3$ RTT



CTS $Z = 1.464$

P-Value $P = .072$ ✓

1-PropZTest

$p_0: .3$

$x: 63$

$n: 180$

Prop > p_0 RTT

$Z = \text{invNorm}(.99, 0, 1)$

CTS is in NCR H_0 Valid

P-Value > α H_1 invalid

what α values reverses the conclusion?

We need P-Value $\leq \alpha$

$.072 \leq \alpha$

Valid claim → FTR the claim

We can choose .08, .09, .1.

May 4-7:06 PM

Given CTS $Z = 1.464$ RTT

Find p-Value.

Area

P-Value = normalcdf(1.464, E99, 0, 1)

= .072

$\mu = 0$
$\sigma = 1$

1.464

May 4-7:20 PM

A report says the mean score of all SAT exams is 1250. $\mu = 1250$ ← H_0

I took 30 SAT exams ($n = 30$) their mean score was 1300. $\bar{x} = 1300$

It is known that standard deviation of all SAT exams is 75. $\sigma = 75$

Test the claim. No $\alpha \rightarrow .05$

H_0: $\mu = 1250$ claim

H_1: $\mu \neq 1250$ TTT

σ Known

CV Z TTT $\alpha = .05$

CTS $Z = 3.651$

P-Value $P = 2.6 \times 10^{-4}$

Z-Test

Input: STATS

$\mu_0 = 1250$

$\sigma = 75$

$\bar{x} = 1300$

$n = 30$

$\mu \neq \mu_0$ TTT

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

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

Z=invNorm(.975,0,1)

CTS is in CR ⇒ P-Value $\leq \alpha$

H_0 invalid

H_1 valid

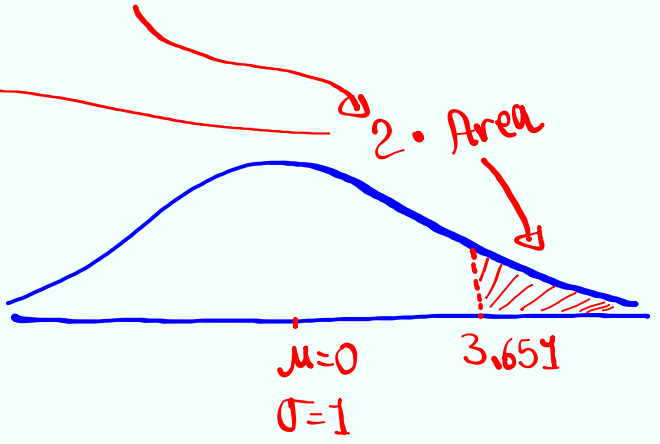
Invalid claim

Reject the claim

May 4-7:23 PM

CTS $Z = 3.651$ TTT

find p-value.



$P\text{-Value} = 2 \cdot \text{normalcdf}(3.651, E99, 0, 1)$

$\approx \boxed{2.6 \times 10^{-4}}$

May 4-7:36 PM

College claims that the mean age of all students is below 30 yrs. $\mu < 30$ (H_1)

I took a sample of 25 students, their mean age was 28.5 yrs with standard dev. of 7.5 yrs. $n=25$ $\bar{x}=28.5$ $S=7.5$

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

$H_0: \mu \geq 30$

$H_1: \mu < 30$ claim, LTT

σ unknown

cv t LTT $\alpha=.02$

$df = n-1 = 24$

CTS $t=-1$

P-Value $P = .164$ ✓

T-Test

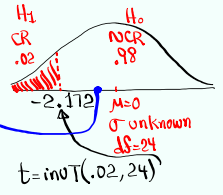
$\mu_0: 30$

$\bar{x} = 28.5$

$S = 7.5$

$n = 25$

$\mu < \mu_0$



$t = \text{invT}(.02, 24)$

CTS is in NCR ⇒ H_0 valid, H_1 invalid

P-Value > α

Invalid claim

Reject the claim

If we choose new α such that P-value ≤ α we fail to reject

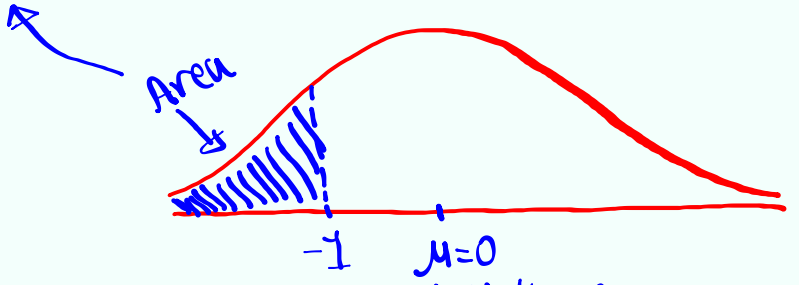
$.164 \leq \alpha$ choose α

.17, .18, .19, .20, .21, ...

May 4-7:39 PM

Given CTS $t=-1$, LTT, $df=24$

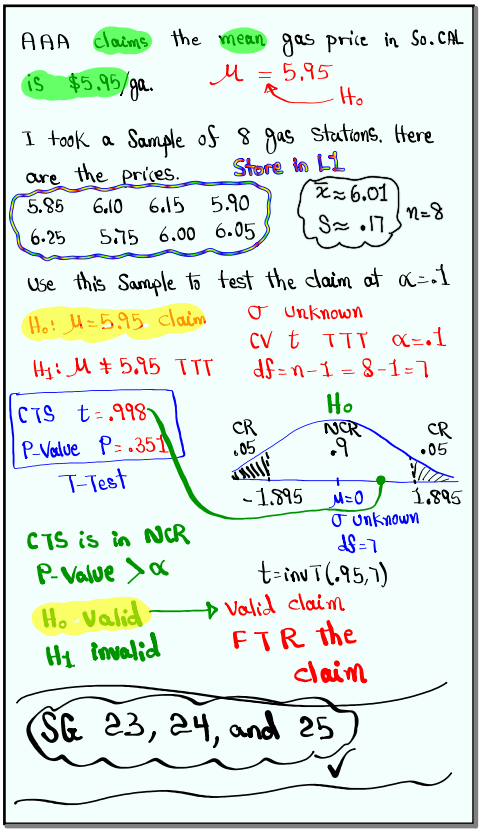
Find p-value.



P-Value = tcdf(-E99, -1, 24)

= .164

May 4-7:53 PM



May 4-7:56 PM