Statistics

Lecture 25

Feb 19-8:47 AM

CNN reported that 80% of Kids under the age of 10 believe in Santa claus. $p = .8$ (H_0)

I took a Sample of 280 Kids and 85% of them believed in Santa claus. $n = 280$, $\hat{p} = .85$

$x = n\hat{p} = 280(.85) = 238$

if decimal → Round-up

No α → .05

Test the claim.

$H_0: p = .8$ claim

$H_1: p \neq .8$ 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 $Z = 2.092$

P-Value $P = .036$ ✓

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

1-PropZTest

$P_0: .8$ H_0

$x: 238$

$n: 280$

Prop ≠ P_0 H_1

Calculate

CTS is in CR

P-value $\leq \alpha$

H_0 invalid H_1 valid

Invalid claim

Reject the claim

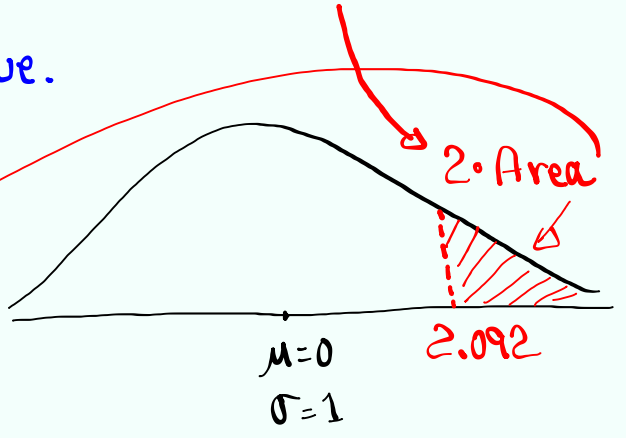
to reverse the conclusion we want P-value $> \alpha$, $.036 > \alpha$

we choose α to be .03, .02, .01

Dec 1-10:37 AM

Given CTS $Z = 2.092$ TTT

Find the p-value.



P-Value

$= 2 \cdot \text{normalcdf}(2.092, E99, 0, 1)$

$= \boxed{.036}$

Dec 1-10:54 AM

LAUSD claims that the mean age of all teachers in the district is below 50 yrs.

$\mu < 50$ ← H_1

I took a Sample of 34 teachers and their mean age was 48 yrs. $n=34$, $\bar{x}=48$

Assume Standard deviation of ages of all teachers in the district is 10 yrs, use $\alpha=.02$ to test the claim. $\sigma=10$

H_0: $\mu \geq 50$

H_1: $\mu < 50$ claim, LTT

σ known → Case I

CV Z LTT $\alpha=.02$

CR .02 H_1 | NCR .98 H_0

$= -2.054$

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

CV $Z = \text{invNorm}(.02, 0, 1)$

CTS $Z = -1.166$

P-value $P = .122$

Z-Test

inpt: Stats

$\mu_0 : 50$ H_0

$\sigma = 10$

$\bar{x} = 48$

$n = 34$

$\mu < \mu_0$ H_1

Calculate

CTS is in NCR

P-value $> \alpha$

H_0 valid, H_1 invalid

Invalid claim

Reject the claim

To reverse the conclusion, we want

P-Value $\leq \alpha$ $.122 \leq \alpha$ we choose α to be .13, .15, .20, ...

Dec 1-10:58 AM

LACCD claims the mean age of all students is 32.5 yrs. $\mu = 32.5$ (H_0)

I took a sample of 20 students, their mean age was 27.5 yrs with standard dev. of 8.5 yrs. $n = 20$, $\bar{x} = 27.5$, $s = 8.5$

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

$H_0: \mu = 32.5$ claim

$H_1: \mu \neq 32.5$ TTT

CTS $t = -2.631$

P-Value $P = .016$

T-Test

inpt: Stats

$\mu_0: 32.5$ H_0

$\bar{x} = 27.5$

$s = 8.5$

$n = 20$

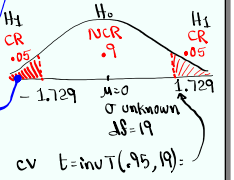
μ ($\neq \mu_0$) H_1

Calculate

σ unknown → Case II

cv t invT TTT

$\alpha = .1$ $df = n - 1 = 19$



cv $t = \text{invT}(.95, 19) =$

CTS is in CR

P-Value $\leq \alpha$

H_0 invalid

H_1 valid

Invalid claim → Reject the claim

If we want to support the claim, we should have P-Value $> \alpha$

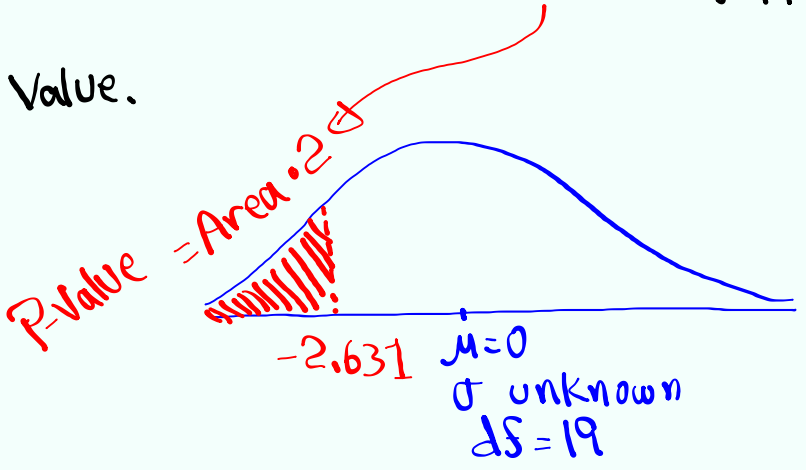
$.016 > \alpha$

Pick $\alpha = .015, .014, \ldots, .01,$

Dec 1-11:15 AM

Given CTS $t = -2.631$ TTT $df = 19$

Find p-value.



P-Value $= 2 \cdot \text{tcdf}(-E99, -2.631, 19)$

$= \boxed{.016}$

Dec 1-11:32 AM

Consider the Sample below:

73	85	98	70	82
100	75	90	80	95

Find

1) $\bar{x} = 84.8 \approx 85$ } Round to whole #

2) $S = 10.654 \approx 11$ } Round to whole #

No $\alpha \rightarrow .05$

Test the claim that μ is not 90.

$\mu \neq 90$ ← H_0

H_0: $\mu = 90$

H_1: $\mu \neq 90$ claim TTT

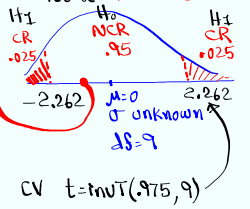
σ unknown

CV t invT TTT

No $\alpha \rightarrow \alpha = .05$ df=9

CTS $t = -1.437$

P-Value $P = .184$



T-Test

inpt: Stats

μ_0: 90 H_0

$\bar{x}$=85

S=11

n=10

μ $\neq \mu_0$ H_1

CV t=invT(.975, 9)

CTS is in NCR

P-value > α

Reject the claim

H_0 valid H_1 invalid

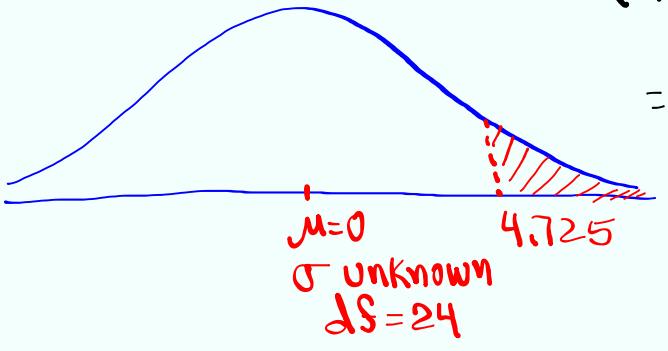
Invalid claim

Dec 1-11:38 AM

Find $P(t > 4.725)$ with df=24.

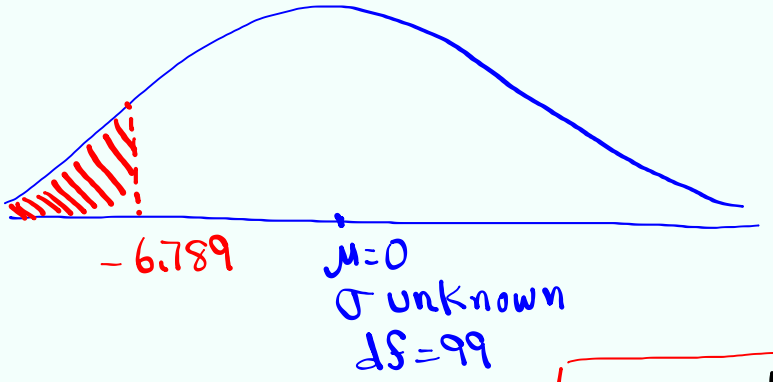
$= tcdf(4.725, E99, 24)$

$= 4.178 \times 10^{-5}$



Dec 1-11:53 AM

find $p(t < -6.789)$ with $df = 99$.



$= tcdf(-E99, -6.789, 99) = 4.217 \times 10^{-10}$

Dec 1-11:57 AM