

Statistics

Lecture 16



Feb 19 8:47 AM

Testing One Population Proportion:

(SG 24)

$$\begin{array}{lll} H_0: p = p_0 & \left. \begin{array}{l} H_0: p \geq p_0 \\ H_1: p < p_0 \end{array} \right\} & \left. \begin{array}{l} H_0: p \leq p_0 \\ H_1: p > p_0 \end{array} \right\} \\ H_1: p \neq p_0 & LTT & RTT \end{array}$$

Critical Value Z

use invNorm

Draw, label, shade, full TI command

Computed Test statistic CTS and P-Value P

[STAT] [TESTS] [1-PropZTest] ...

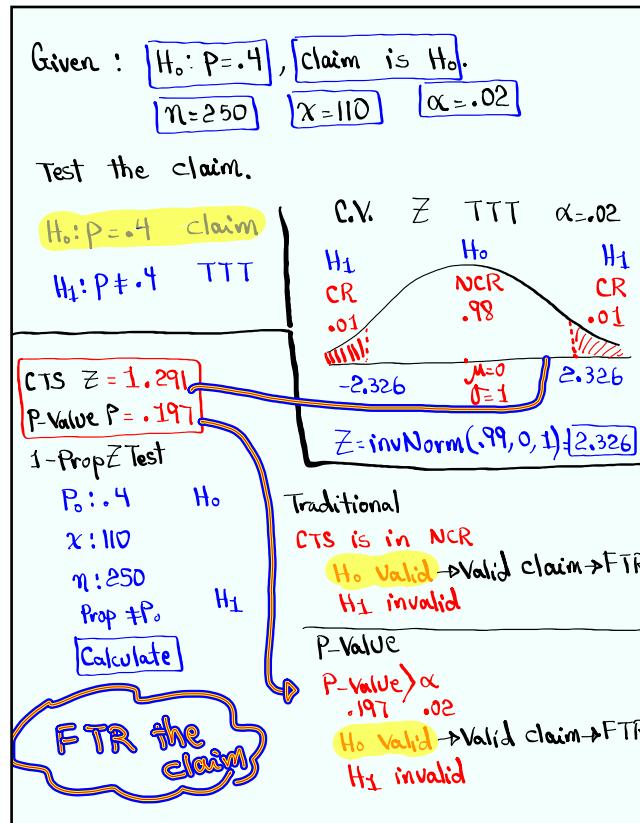
Use **Testing chart** to determine the validity

of $H_0 \rightleftharpoons H_1$.

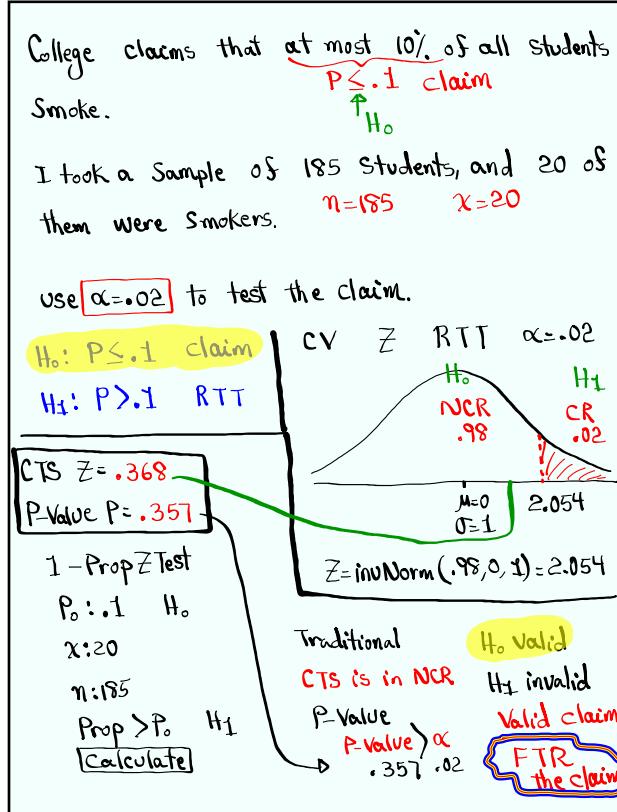
Final conclusion must be about the claim.

Reject the claim OR FTR the claim

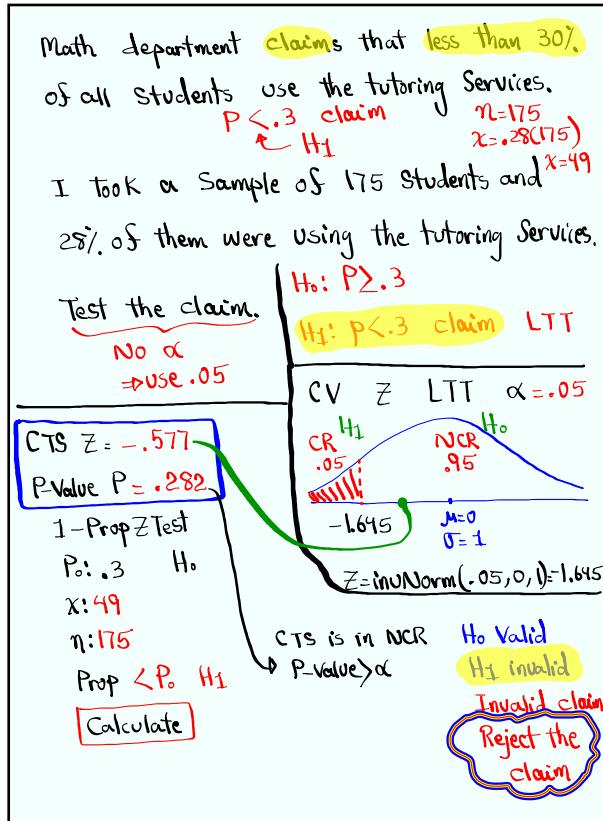
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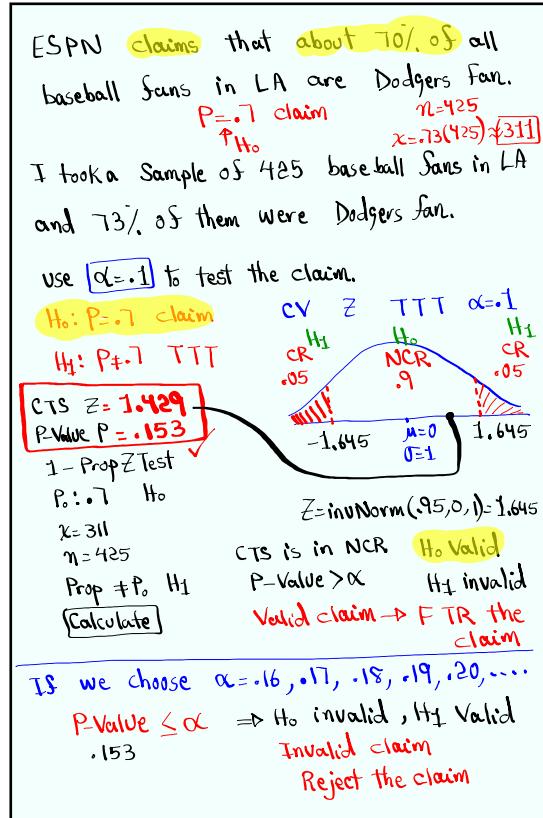
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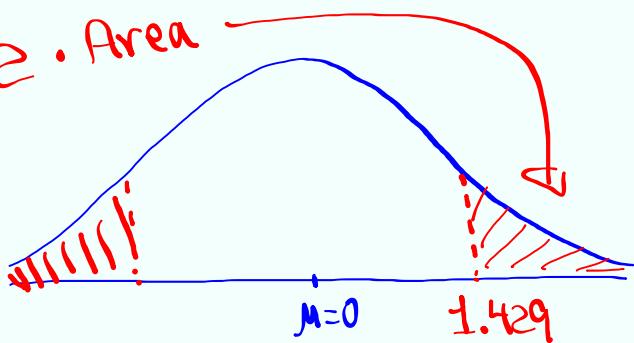
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Given CTS $Z = 1.429$ TTT

Find P-Value = 2 * Area



$$= 2 * \text{normalcdf}(1.429, E99, 0, 1)$$

$$\approx [.153]$$

Jul 29 5:38 PM

Testing one Population Mean:

(SG 25)

$$\begin{array}{l} H_0: \mu = \mu_0 \quad H_0: \mu \leq \mu_0 \quad H_0: \mu \geq \mu_0 \\ H_1: \mu \neq \mu_0 \quad H_1: \mu > \mu_0 \quad H_1: \mu < \mu_0 \\ \text{TTT} \qquad \qquad \text{RTT} \qquad \qquad \text{LTU} \end{array}$$

Case I: σ Known

CV Z invNorm

CTS Z

P-Value P

Z-Test

Testing chart for validity of $H_0 \& H_1$

Final Conclusion about claim

Reject the claim OR FTR
the
claim

Jul 29 5:55 PM

Given $H_0: \mu \leq 82$ claim is $H_1: \mu > 82$ $\alpha = .01$

$\bar{x} = 85$ $\sigma = 12$ $n = 32$

Test the claim.

$H_0: \mu \leq 82$

$H_1: \mu > 82$ claim RTT

CTS $Z = 1.414$ P-Value $P = .079$

Z -Test

Inpt: $\mu_0: 82$ H_0 $\sigma: 12$ $\bar{x}: 85$ $n: 32$ $\mu > \mu_0$ H_1

Calculate

σ Known CV Z RTT $\alpha = .01$

$Z = \text{invNorm}(.99, 0, 1) = 2.326$

CTS is in NCR
P-Value > α
 H_0 Valid H_1 invalid

Invalid claim
Reject the claim

If we choose $\alpha = .08, .09, .10, .11, \dots$
P-Value $\leq \alpha$ H_0 invalid
 H_1 Valid \rightarrow FTR the claim

Jul 29-6:01 PM

College claims the mean age of all students is 28 yrs. $\mu = 28$ claim $\uparrow H_0$

I took a sample of 30 students, their mean age was 24 yrs. $n = 30$ $\bar{x} = 24$

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

No α

Test the claim.

$H_0: \mu = 28$ claim

$H_1: \mu \neq 28$ TTT

CTS $Z = -2.578$ P-Value $P = .010$

Z -Test

Inpt: $\mu_0: 28$ H_0 $\sigma: 8.5$ $\bar{x}: 24$ $n: 30$ $\mu \neq \mu_0$ H_1

Calculate

σ Known CV Z TTT $\alpha = .05$

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

CTS is in CR
P-Value $\leq \alpha$
 H_0 invalid H_1 valid

Invalid claim
Reject the claim

Jul 29-6:13 PM

SG 25

Testing one Population Mean: $H_0: \mu = \mu_0 \quad H_0: \mu \leq \mu_0 \quad H_0: \mu \geq \mu_0$ $H_1: \mu \neq \mu_0 \quad H_1: \mu > \mu_0 \quad H_1: \mu < \mu_0$		
TTT	RTT	LTt

Case I: σ Known	Case II: σ Unknown
$\text{CV } Z$ $\text{CTS } Z$ $P\text{-Value } P$ $Z\text{-Test}$	$\text{CV } t$ $\text{CTS } t$ $P\text{-Value } P$ $T\text{-Test}$

Testing chart for validity of $H_0 \in H_1$
 Final Conclusion about claim
Reject the claim OR FTR the claim

Jul 29 5:55 PM

Given $H_0: \mu \leq 42$ claim is H_0 $\alpha=0.1$
 $\bar{x}=48$ $s=10$ $n=12$

Test the claim.

$H_0: \mu \leq 42$ claim $H_1: \mu > 42$ RTT $\text{CTS } t = 2.078$ $P\text{-Value } P = .031$	σ Unknown $t = \text{invT}(0.9, 11) = 1.363$ CTS is in CR $P\text{-Value} \leq \alpha$ $H_0 \text{ invalid}$ $H_1 \text{ valid}$ Invalid claim Reject the claim
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If we choose $\alpha=.03, .02, .01$
 $P\text{-Value} > \alpha \Rightarrow H_0 \text{ Valid}$ $H_1 \text{ invalid}$
 $.031$ Valid claim
 FTR the claim

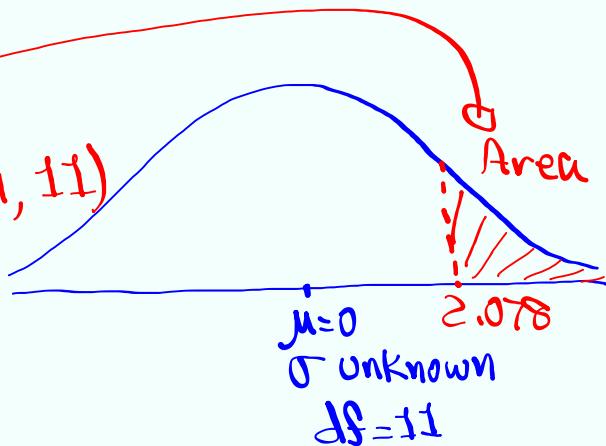
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CTS $t = 2.078$ $df = 11$ RTT

find P-Value

$$= tcdf(2.078, E99, 11)$$

$$\approx .031$$



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I randomly selected 8 exams, here are the Scores

78 85 100 92
90 98 55 80

find \bar{x} & s . Round to

$$\bar{x} = 82.25 \quad n = 8$$

$$s = s_{\bar{x}} = 15.031 \quad S = 15$$

No $\alpha \rightarrow .05$

Test the claim that the mean of all exams is 88.

$H_0: \mu = 88$ claim

$H_1: \mu \neq 88$ TTT

CTS $t = -1.131$
PValue $P = .295$

T-Test
inpt: [Stats]

$$\mu_0 = 88 \quad H_0$$

$$\bar{x} = 82$$

$$S = 15$$

$$n = 8$$

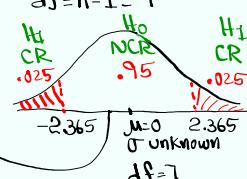
$$\mu \neq \mu_0 \quad H_1$$

[Calculate]

σ Unknown

CV t TTT $\alpha = .05$

$$df = n - 1 = 7$$



$$t = invT(.975, 7)$$

CTS is in NCR H_0 Valid

P-Value $> \alpha$

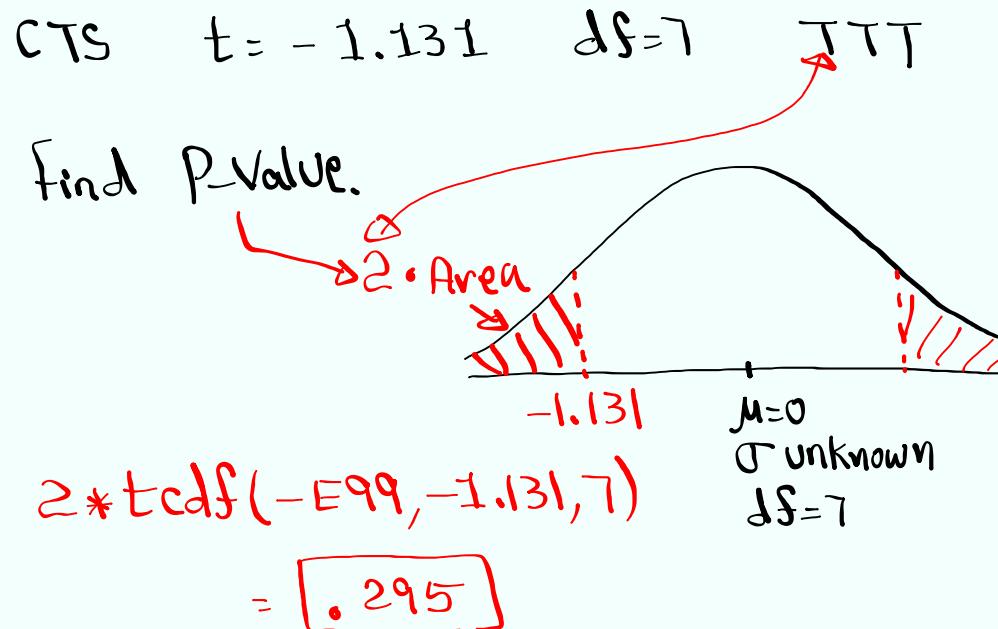
$$.295 > .05$$

H_1 invalid

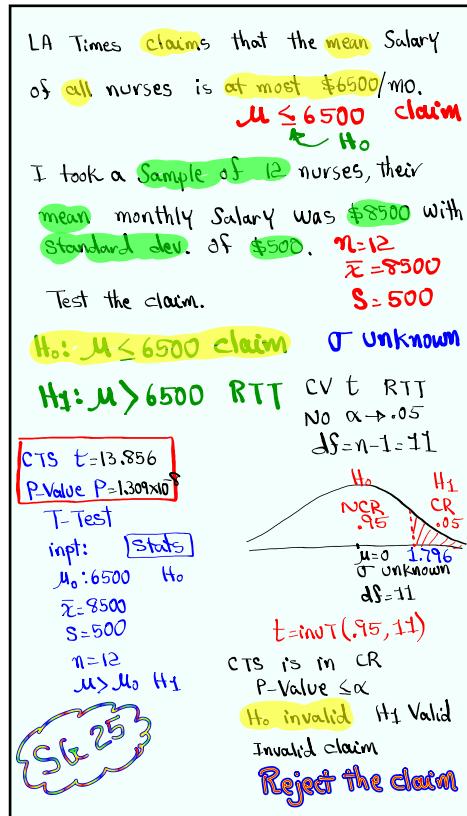
Valid claim

FTR The claim

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