

Statistics

Lecture 51



Feb 19-8:47 AM

$P \leq 0.3$
 Dept. claims that at most 30% of all students have used the tutoring lab. $\hat{p} = 0.34$
 $n = 80$
 I surveyed 80 students and 34% of them had used the tutoring lab. $x = n\hat{p}$
 use $\alpha = 0.01$ to test the claim. *is decimal \rightarrow Round up*
 $x = 80(0.34) = 27.2$
 $x \approx 28$

$H_0: p \leq 0.3$ claim
 $H_1: p > 0.3$ RTT

CV Z invNorm
 RTT $\alpha = 0.01$

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

CTS $Z = 0.976$
P-value $P = 0.165$

1-Prop Z Test
 $P_0 = 0.3$ H_0
 $x = 28$
 $n = 80$
 $\text{Prop} > P_0$ H_1

CTS is in NCR $\Rightarrow H_0$ valid
 $P\text{-value} > \alpha \Rightarrow H_1$ invalid
 \Rightarrow valid claim
 FTR the claim

Dec 4-8:52 AM

Given: $H_0: \mu = 125$, claim is H_1 , $\alpha = .04$
 $\sigma = 20$, $n = 30$, $\bar{x} = 115$.

Test the claim.

$H_0: \mu = 125$
 $H_1: \mu \neq 125$ claim, TTT

CV Z in Norm
 TTT $\alpha = .04$

CTS $Z = -2.739$
 P-value $P = .006$

Z-Test
 inpt: Stats
 $\mu_0 = 125$ H_0
 $\sigma = 20$
 $\bar{x} = 115$
 $n = 30$
 $\mu \neq \mu_0$ H_1

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

$Z = \text{invNorm}(.98, 0, 1)$

Dec 4-9:03 AM

I randomly Selected 12 exams. Here are the Scores:

72	88	65	100
80	90	70	95
58	78	100	98

Sample

Find
 1) $\bar{x} \approx 83$
 2) $S \approx 14$
 3) $n = 12$

Round to whole #

No $\alpha \rightarrow .05$

Test the claim that the mean of all exams is below 85.

$H_0: \mu \geq 85$
 $H_1: \mu < 85$ claim, LTT

CV t LTT $\alpha = .05$
 $df = n - 1 = 11$

CTS $t = -.495$
 P-value $P = .315$

T-Test
 inpt: Stats
 $\mu_0 = 85$ H_0
 $\bar{x} = 83$
 $S = 14$
 $n = 12$
 $\mu < \mu_0$ H_1

CTS is in NCR $\Rightarrow H_0$ valid
 $P\text{-value} > \alpha \Rightarrow H_1$ invalid
 Invalid claim
 Reject the claim.

$t = \text{invT}(.05, 11)$

Dec 4-9:15 AM

The department claims that standard deviation of scores of all exams is 10.

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

$H_0: \sigma = 10$ claim P-value Method only.
 $H_1: \sigma \neq 10$ TTT CTS $\chi^2 = \frac{(n-1) \cdot S^2}{\sigma^2}$

$\chi^2 = \frac{(12-1) \cdot 14^2}{10^2} = 21.56$

Df = n-1 = 11

$\chi^2_{cdf}(21.56, E99, 11) = 0.028$

$\chi^2_{cdf}(0, 21.56, 11) = 0.972$

P-value $\leq \alpha$
 $.056 \leq .1$ H_0 invalid H_1 valid \rightarrow Invalid claim
 Reject the claim

If we change α to .05, .04, .03, .02, or .01
 P-value $> \alpha \rightarrow H_0$ valid \rightarrow Valid claim
 H_1 invalid **FTR the claim.**

Dec 4-9:29 AM

Female nurses: $n_1 = 10, \bar{x} = 48, S = 8$.
 Male nurses: $n_2 = 12, \bar{x} = 40, S = 12$.

Use $\alpha = .02$ to test the claim that two Pop. Standard deviations are the same.

$H_0: \sigma_1 = \sigma_2$ claim
 $H_1: \sigma_1 \neq \sigma_2$ TTT

Male	Female
$n_1 = 12$	$n_2 = 10$
$S_1 = 12$	$S_2 = 8$
$S_1 > S_2$	

NTS $F = \frac{S_1^2}{S_2^2} = \frac{12^2}{8^2} = 2.25$ ✓
 Df = $n_1 - 1 = 11$
 Df = $n_2 - 1 = 9$

$F_{cdf}(2.25, E99, 11, 9) = 0.117$

$F_{cdf}(0, 2.25, 11, 9) = 0.883$

P-value = 2 (smaller) = 0.234

P-value $> \alpha$
 $.234 > .02$ H_0 valid H_1 invalid \rightarrow Valid claim \rightarrow FTR the claim

Use 2-Samp F Test to verify these answers

2-Samp F Test
 Input: Stats
 $S_1 = 12$
 $n_1 = 12$
 $S_2 = 8$
 $n_2 = 10$
 $\sigma_1 \neq \sigma_2$ H_1

CTS $F = 2.25$
P-value $P = .234$

Dec 4-9:42 AM