

# Statistics

## Lecture 45



Feb 19-8:47 AM

Testing One Population Proportion

$$\begin{array}{l}
 H_0: P = P_0 \\
 H_1: P \neq P_0 \\
 \text{TTT}
 \end{array}
 \left\{
 \begin{array}{l}
 H_0: P \geq P_0 \\
 H_1: P < P_0 \\
 \text{LTT}
 \end{array}
 \right\}
 \begin{array}{l}
 H_0: P \leq P_0 \\
 H_1: P > P_0 \\
 \text{RTT}
 \end{array}$$

**C.V.** Use invNorm  
Drawing, labeling, shading, TI command required.

**CTS** Z     **STAT** **TESTS** **1-PropZTest**

**P-Value** P

Use Testing chart to determine the validity of  $H_0$  &  $H_1$

Draw Final Conclusion for the claim.

**Reject the claim OR FTR the claim**

Nov 20-8:56 AM

The College claims that 20% of all students are in favor of online classes.

$H_0: P = .2$  claim

$H_1: P \neq .2$  TTT

I surveyed 150 students and 28% of them were in favor of online classes.

$n = 150 \rightarrow x = n\hat{p} = 150(.28) \quad [x = 42]$   
 $\hat{p} = .28$

Use this Survey to test the claim with  $\alpha = .02$

CV invNorm TTT  $\alpha = .02$

$Z_{\alpha/2} = \text{invNorm}(.99, 0, 1) = [-2.326]$

Traditional Method  
 CTS is in CR.  
 $H_0$  invalid invalid claim  $\rightarrow$  Reject the claim  
 $H_1$  valid

P-Value Method  
 $P\text{-Value} < \alpha$   
 $.014 < .02$   
 $H_0$  invalid Invalid claim  $\rightarrow$  Reject it.  
 $H_1$  valid

CTS  $Z = 2.449$   
 P-Value  $P = .014$   
 1 - Prop Z Test  
 $P_0: .2$   
 $x = 42$   
 $n = 150$   
 Prop  $\neq P_0$  (TTT)  $H_1$  Calculate

If we change  $\alpha$  to .01,  
 $P\text{-value} > \alpha \Rightarrow H_0$  valid  $\rightarrow$  Valid claim  
 $.014 > .01 \quad H_1$  invalid **FTR**

Nov 20-9:03 AM

The College claims that less than 10% of all female students are STEM majors.

$H_0: P \geq .1$

$H_1: P < .1$  claim, LTT

I surveyed 175 female students and 8.5% of them were STEM majors.

$n = 175 \quad x = n\hat{p} = 175(.085) = 14.875 \quad [x = 15]$   
 $\hat{p} = 8.5\% = .085$

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

CV invNorm LTT  $\alpha = .02$

$Z = \text{invNorm}(.02, 0, 1) = [-2.054]$

CTS  $Z = -.630$   
 P-Value  $P = .264$   
 1 - Prop Z Test  
 $P_0: .1$   
 $x = 15$   
 $n = 175$   
 Prop  $< P_0 \quad H_1$  Calculate

CTS is in NCR  
 $H_0$  valid  
 $H_1$  invalid invalid claim  
 Reject the claim

$P\text{-Value} > \alpha$   
 $.264 > .02$   
 $H_0$  valid  
 $H_1$  invalid

Nov 20-9:19 AM

LA Times claims that **at most 75%** of all LA residents are fan of LA Dodgers.

$H_0: P \leq .75$  claim  
 $H_1: P > .75$  RTT

In a survey of 325 LA residents, 78% of them were LA Dodger's fan.

$n = 325$   
 $\hat{p} = .78 \rightarrow x = n\hat{p} = 325(.78) = 253.5$   $x = 254$

Use this survey to test the claim made by LA Times. **No  $\alpha \rightarrow$  Use .05**

**CV** inv Norm RTT  $\alpha = .05$  P-value

$Z = \text{invNorm}(.95, 0, 1)$   
 $= 1.645$

**CTS**  $Z = -1.313$  CTS is in NCR  
**P-value**  $P = .095$  P-value  $> \alpha$   
 $.095 > .05$

$1 - \text{Prop Z Test}$   
 $P_0 = .75$   
 $x = 254$   
 $n = 325$   
 $\text{Prop} > P_0$   $H_1$   
Calculate

$H_0$  valid  $\rightarrow$  valid claim  
 $H_1$  invalid FTR the claim

**P-value  $\leq .1$**   
 $.095$   
 choose  $\alpha = .1$   
 P-value  $\leq \alpha$   
 $H_0$  invalid  
 $H_1$  valid

**Invalid claim  $\rightarrow$**   
**Reject it.**

Nov 20-9:35 AM