

**Statistics**  
**Spring 2023**  
**Lecture 48**



Feb 19-8:47 AM

SG 25

Testing one population Proportion:

$H_0: P = P_0$	}	$H_0: P \geq P_0$	}	$H_0: P \leq P_0$
$H_1: P \neq P_0$	}	$H_1: P < P_0$	}	$H_1: P > P_0$
TTT		LTT		RTT

Always identify the claim, and type of test.

Find all Critical Values  $Z_c$ .

Draw, label, shade, and TI command.

Find Computed Test Statistic (CTS) and P-Value(P).

1- Prop Z Test,  $Z = \frac{\hat{P} - P}{\sqrt{\frac{Pq}{n}}}$

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**  
 (claim is invalid)                      (claim is valid)

May 10-7:15 AM

Given:  $n=150$ ,  $\hat{P}=.12$ ,  $\alpha=.02$ ,  $H_0: P=.1$   
 claim is  $H_0 \rightarrow x=n\hat{P}=18$

Test the claim.  
 $H_0: P=.1$  claim  
 $H_1: P \neq .1$  TTT

C.V.  $Z$ , TTT,  $\alpha=.02$

CTS  $Z = .816$   
 P-Value  $P = .414$

1-Prop Z Test  
 $P_0 = .1$   $H_0$   
 $x = 18$   
 $n = 150$   
 Prop  $\neq P_0$   $H_1$   
 Calculate

$Z_{\alpha/2} = \text{invNorm}(.99, 0, 1)$   
 $Z_{.02} = 2.326$

CTS is in NCR  
 $H_0$  valid &  $H_1$  invalid  
 $P\text{-Value} > \alpha$   
 $.414 > .02$   
 $H_0$  valid &  $H_1$  invalid  
 $H_0$  is the claim,  
 Valid claim,  
 Fail-to-Reject  
 the claim

CTS  $Z = \frac{\hat{P} - P}{\sqrt{\frac{PQ}{n}}}$   
 $= \frac{.12 - .1}{\sqrt{\frac{(.1)(.9)}{150}}} = .816$

P-value  
 Area \* 2 = P-Value  
 $= 2 * \text{normalcdf}(.816, E99, 0, 1)$   
 $= .415$

May 10-7:24 AM

The College claims that at most 42% of all students have part-time job.  $P \leq .42$

In a survey of 180 students, 45% of them had part-time job.  
 $n=180$   
 $\hat{P}=.45 \rightarrow x=n\hat{P}=180(.45) = 81$

Use  $\alpha=.02$  to test the claim.  
 $H_0: P \leq .42$  claim  
 $H_1: P > .42$  RTT

C.V.  $Z$  invNorm RTT  
 $\alpha=.02$

CTS  $Z = .815$   
 P-Value  $P = .207$

1-Prop Z Test  
 $P_0 = .42$   $H_0$   
 $x = 81$   
 $n = 180$   
 Prop  $> P_0$   $H_1$   
 Calculate

$Z_{.02} = \text{invNorm}(.98, 0, 1)$   
 $Z_{.02} = 2.054$

CTS is in NCR  
 $H_0$  valid &  $H_1$  invalid  
 $P\text{-Value} > \alpha$   
 $.207 > .02$   
 $H_0$  valid &  $H_1$  invalid  
 $H_0$  claim  
 Valid claim  
 FTR the claim

CTS  $Z = \frac{\hat{P} - P}{\sqrt{\frac{PQ}{n}}}$   
 $= \frac{.45 - .42}{\sqrt{\frac{(.42)(.58)}{180}}} = .815$

P-value  
 Area = P-Value  
 $= \text{normalcdf}(.815, E99, 0, 1)$   
 $= .208$

May 10-7:40 AM

The College **claims** that **less than 20%** of all students use the tutoring services at college.

$P < .2$  claim  
 $\uparrow$   
 No = sign  $\rightarrow H_1$

I surveyed **325** students and **18%** of them were using the tutoring services at college.

$n = 325 \Rightarrow x = n\hat{p} = 325(.18)$   
 $\hat{p} = .18$   $x = 59$

Test the claim.

$H_0: P \geq .2$   $\rightarrow$  NO  $\alpha \Rightarrow$  Use  $.05$

$H_1: P < .2$  claim, LTT CV Z LTT  $\alpha = .05$

CTS  $Z = -.832$   
 P-value  $P = .203$

$Z = \text{invNorm}(.05, 0, 1)$

CTS is in NCR  
 $H_0$  valid  $\hat{=} H_1$  invalid  
 $P\text{-value} > \alpha$   
 $.203 > .05$   
 $H_0$  valid  $\hat{=} H_1$  invalid  
 Invalid claim  
Reject the claim

1- Prop Z Test  
 $P_0: .2$   $H_0$   
 $x = 59$   
 $n = 325$   
 $\text{Prop.} < P_0$   $H_1$   
Calculate

May 10-7:56 AM

LA Times has **reported** that **80%** of LA residents are not in favor of treatment of homeless people by the city.

$P = .8$  claim, Report  
 $\uparrow$   
 it is  $H_0$ .

In a **survey of 825** LA residents, **627** of them agreed that city is not doing a good job in relation with homeless people.

$n = 825$   
 $x = 627$

Test the claim using  $\alpha = .1$ .

$H_0: P = .8$  claim  
 $H_1: P \neq .8$  TTT CV Z TTT  $\alpha = .1$

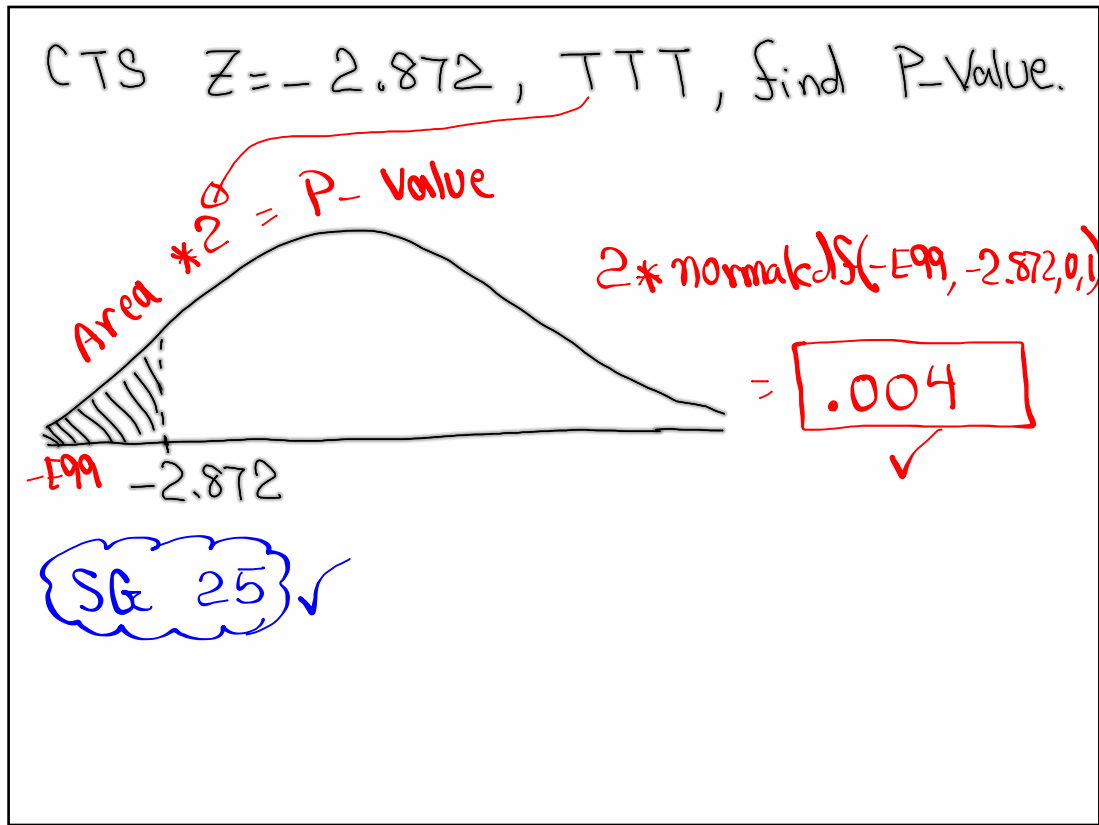
CTS  $Z = -2.872$   
 P-value  $P = .004$

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

CTS is in CR.  
 $H_0$  invalid,  $H_1$  valid  
 $P\text{-value} \leq \alpha$   
 $.004 \leq .1$   
 $H_0$  invalid,  $H_1$  valid  
 Invalid claim  
Reject the claim

1- Prop Z Test  
 $P_0: .8$   $H_0$   
 $x = 627$   
 $n = 825$   
 $\text{Prop.} \neq P_0$   $H_1$

May 10-8:10 AM



May 10-8:25 AM