

**Testing a Claim About the Population Proportion
Example 1 (Left Tail Test)**

The Office for Community College Instruction reports that the proportion of California Community College students that use a college tutoring center at least two hours in a semester is .45. The Math instructors at FLC believe that the proportion would be lower for FLC students due to the excellent instruction they receive at FLC. A random sample of 300 FLC students was taken and it was found that **123 of the 300 students sampled** used the tutoring center at least two hours in a semester. Test the claim at a **.06 significance level** that **the proportion of students that use the tutoring center at least two hours** in a semester at FLC **is less than .45**

$n \cdot p \geq 5$ and $n \cdot q \geq 5$ test is passed. We can use the Z table.

$H_0: p = .45$ ($q = .55$)

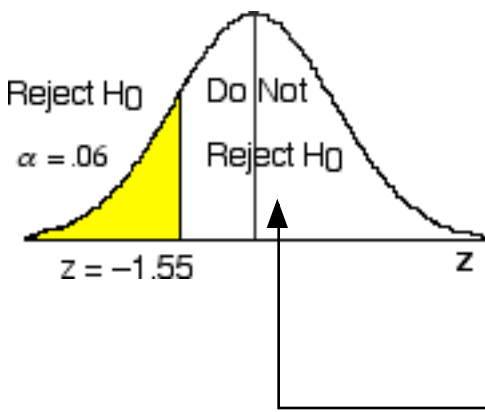
Sample Proportion: $\hat{p} = \frac{123}{300} = .41$

$H_1: p < .45$ (One Tail test, Left Tail)

$n = 300$

$\alpha = .06$ (all .06 in the left tail)

Graph of Critical information:



Test Statistic:

$$z = \frac{(\hat{p} - p)}{\sqrt{\frac{pq}{n}}}$$

$$z = \frac{(.41 - .45)}{\sqrt{\frac{(.45)(.55)}{300}}}$$

Negative Z Scores										
Standard Normal (Z) Distribution: Cumulative Area to the LEFT of Z										
Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559

Conclusion based on H_0 : Do not Reject H_0

Conclusion based on the problem:

There **is not sufficient evidence** at the $\alpha = .06$ level **to reject the hypothesis** that the proportion of students that use the tutoring center at least two hours in a semester at FLC **is equal to .45**
or

There is **not sufficient evidence** at the $\alpha = .06$ level **to support the claim** that the proportion of students that use the tutoring center at least two hours in a semester at FLC **is less than .45**

Testing a Claim About the Population Proportion Example 2 (Right Tail Test)

The latest Zogby polling information reports that the proportion of college students age 18 to 24 who report being registered as Republican is .37. A sociology instructor at Folsom Lake College thinks that this proportion is too low for this college. To help find out if this is true a school statistics class polls a random sample of 80 FLC students age 18 to 24. The class finds that that **36 of the 80 students** in the random sample are registered as Republican. Test the claim at the **.10 significance level that the proportion of FLC college students age 18 to 24 who who are registered Republican is more than .37**

$n \cdot p \geq 5$ and $n \cdot q \geq 5$ test is passed. We can use the Z table.

$$H_0: p = .37 \quad (q = .63)$$

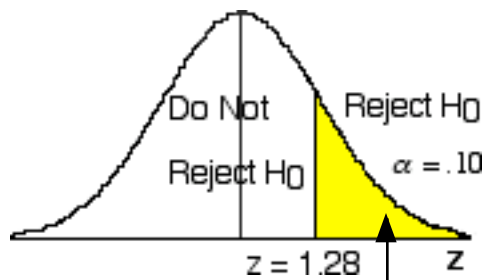
$$\text{Sample Proportion : } \hat{p} = \frac{36}{80} = .45$$

$$H_1: p > .37 \quad (\text{One Tail, Right Tail})$$

$$n = 80$$

$$\alpha = .10 \quad (\text{all .10 in the right tail})$$

Graph of Critical information:



Test Statistic:

$$z = \frac{(\hat{p} - p)}{\sqrt{\frac{pq}{n}}}$$

$$z = \frac{(.45 - .37)}{\sqrt{\frac{(.37)(.63)}{80}}}$$

$$z = 1.48$$

Positive Z Scores

Standard Normal (Z) Distribution: Cumulative Area to the LEFT of Z

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015

Conclusion based on H_0 : Reject H_0

Conclusion based on the problem:

There is sufficient evidence at the $\alpha = .10$ level to **support the claim** that the proportion of FLC college students age 18 to 24 who are registered Republican is **more than .37**

Testing a Claim About the Population Proportion Example 3 (Two Tail Test)

The school librarian says that other colleges report that the proportion of day time college students who visit college library at least twice a month is .65. The college librarian does not feel that this reflects the students at FLC who are known to be very well read students. She takes a random sample of 80 FLC day time students and finds that **56 of the 80** students in the sample visit the library at least twice a month. Test the claim at the **.10 significance level** that the **proportion of FLC day time students that visit the library at least twice a month is not equal to .65**

$n \cdot p \geq 5$ and $n \cdot q \geq 5$ test is passed. We can use the Z table.

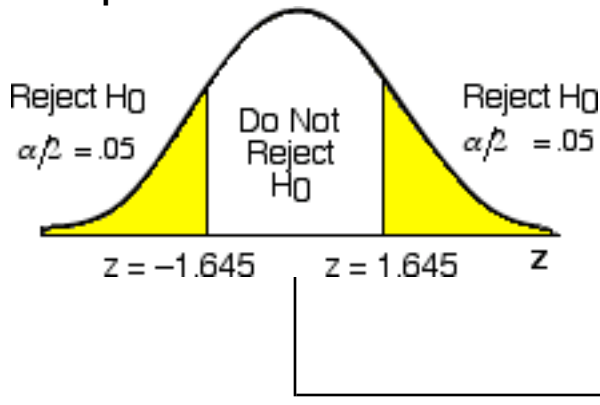
$$H_0: p = .65 \quad (q = .35)$$

$$\text{Sample Proportion : } \hat{p} = \frac{56}{80} = .70$$

$$H_1: p \neq .65 \quad (\text{Two Tail Test})$$

$$n = 80 \quad \alpha = .10 \quad \alpha/2 = .05 \text{ in each tail}$$

Graph of Critical information:



Test Statistic:

$$z = \frac{(\hat{p} - p)}{\sqrt{\frac{pq}{n}}}$$

$$z = \frac{(.70 - .65)}{\sqrt{\frac{(.65)(.35)}{80}}}$$

Negative Z Scores							
Standard Normal (Z) Distribution: Cumulative Area to the LEFT of Z							
Z scores of -3.5 or less use .0001	AREA	Z Score	AREA	Z Score	AREA	Z Score	
	0.0500	-1.645	0.0050	-2.575			

Conclusion based on H_0 : Do not Reject H_0

Conclusion based on the problem:

There **is not sufficient evidence** at the $\alpha = .10$ level to **reject the hypothesis** that the proportion of FLC day time students that visit the library at least twice a month **is equal to .65**

or

There **is not sufficient evidence** at the $\alpha = .10$ level to **support the claim** that the proportion of FLC day time students that visit the library at least twice a month **is not equal to .65**