

Name: Solutions
Date: 4/29/2025

Math 130
Quiz 16

A formula you may need:

$$z = \frac{\hat{p}_1 - \hat{p}_2 - (p_1 - p_2)}{\sqrt{\hat{p}\hat{q}} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

1. (10 points) It has been claimed that stats classes at PCC have a higher retention rate than stats classes at Rio Hondo (a retention rate is the percentage of students who register for a class and stick it out until the end of the class without dropping). In the Fall of 2012 this claim was tested by taking a sample of 175 students at PCC and 120 students at Rio Hondo who were registered in an Intro to Statistics course on the first day of classes. Of the 175 PCC students sampled, 151 students remained in the class until the end of the semester. Of the 120 Rio Hondo students sampled, 99 students remained in the class until the end of the semester. Test the claim at the 0.07 significance level. Use the p-value method.

2-population p problem, independent samples

pop 1 = All PCC stats students

p_1 = The percentage of all PCC stats students that do not drop their stats class

sample 1 $n_1 = 175$
 $x_1 = 151$
 $\hat{p}_1 = \frac{x_1}{n_1} = \frac{151}{175}$

pop 2 = All Rio Hondo stats students

p_2 = The percentage of all Rio Hondo stats students that do not drop their stats class

sample 2 $n_2 = 120$
 $x_2 = 99$
 $\hat{p}_2 = \frac{x_2}{n_2} = \frac{99}{120}$

$$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2} = \frac{151 + 99}{175 + 120} = \frac{250}{295}$$

$$\hat{q} = 1 - \hat{p} = 1 - \frac{250}{295} = \frac{45}{295}$$

Hypo Test

$H_0: p_1 = p_2$

$H_1: p_1 > p_2$

Test stat

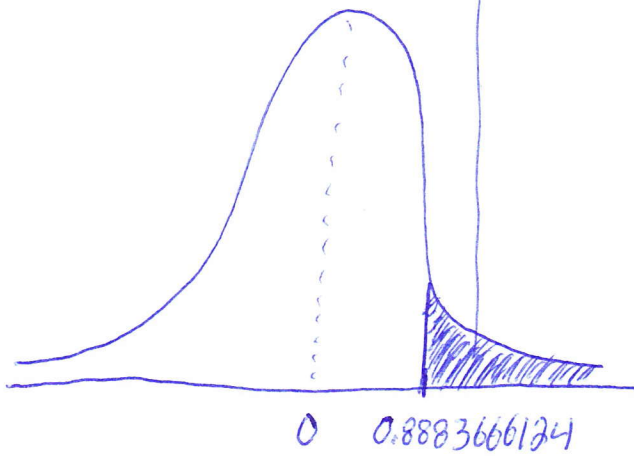
$$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}\hat{q}} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{\left(\frac{151}{175} - \frac{99}{120}\right) - (0)}{\sqrt{\frac{250}{295} \cdot \frac{45}{295}} \sqrt{\frac{1}{175} + \frac{1}{120}}}$$

$$= 0.8883666124$$

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$$\frac{p\text{-value}}{\alpha = 0.07}$$

$$\rightarrow p\text{-value} = P(Z > 0.8883666124) \\ = 0.1872$$



Is $p\text{-value} < \alpha$?

$0.1872 < 0.07$? No!

Conclusion Do not reject H_0 !

Not enough evidence to say that PCC stats students have a higher retention rate than Rio Honda stats students.