Key

Quiz 9

STAT 381, Applied Statistical Methods I, Spring 2015

Name:

In 2013 15% of UIC students had a tablet. It is 2015 and you heard someone say that this has increased to 25%. We will conduct a random survey of 30 students and if 8 or more own a tablet we will believe this claim.

a) (2 points) State the null hypothesis and the (simple) alternative hypothesis.

$H_0: p = .15$

$H_A: p = .25$

b) (2 points) In this context, what would a Type I error be?

To conclude that the proportion has increased when it hasn't.

c) (2 points) In this context, what would a Type II error be?

To conclude the proportion has not increased when it has.

d) (2 points) What is the significance level (α) of the test?

$\alpha = P(X \geq 8 \mid p = .15) = 1 - P(X \leq 7 \mid p = .15)$

$= 1 - \text{binomcdf}(30, .15, 7)$

$= .0698$

e) (2 points) Calculate β for this test.

~~$\beta = P(X \leq 8 \mid p = .25) = P(X \leq 8 \mid H_A) + P(X$~~

$\beta = P(X \leq 7 \mid p = .25) = \text{binomcdf}(30, .25, 7)$

$= .5143$

Bonus (6 points) Suppose that you wanted to use a significance level of .01, and in your random survey you found that 9 out of 30 own a tablet. State what test statistic you want to use, calculate its p-value and state the conclusion of the hypothesis test. *Do not use the rejection rule from the beginning of the problem.*

Use $X = 9$ as a test statistic.

$H_0: p = .15$

$H_A: p > .15$

$\text{p-value} = P(X \geq 9 \mid p = .15$

$= 1 - \text{binomcdf}(30, .15, 8)$

$= .02778$ Don't reject.