Stat 1350, Hypothesis Tests, Fall 2014 Name KEY

Instructions: This experiment will be conducted using a bad of marbles. Your instructor will provide them.

All of the bags of marbles your instructor will provide you have approximately 130 marbles each. The bags contain marbles that can be grouped into two sets (what those are differs from bag to bag). Most of the bags contain 100 (or possibly 99 or 98) of one type of marble and 30 (or 31 or 32) of the second type of marble. You are going to conduct a hypothesis test of the bag of marbles to determine if the one you have is like this with the ratio $p_0 = 76.9\%$ or whether you have the one bag of marbles that is much different.

1. Examine the marbles in your bag and divide them into two categories. We will conduct the hypothesis test on the set you think is larger. What are your two categories? (You can label one and let the second one be "Other".)

   Clear glass other

2. We are going to take a sample of 30 marbles. We will do this by choosing sets of 5 marbles at a time. Select 5 marbles and record the category each belongs in with a tally. Then replace the marbles and remix the bag before selecting another 5. Do this a total of 6 time to collect your 30 samples.

Category A:	**Category B:**
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3. Calculate the probability of the large category.

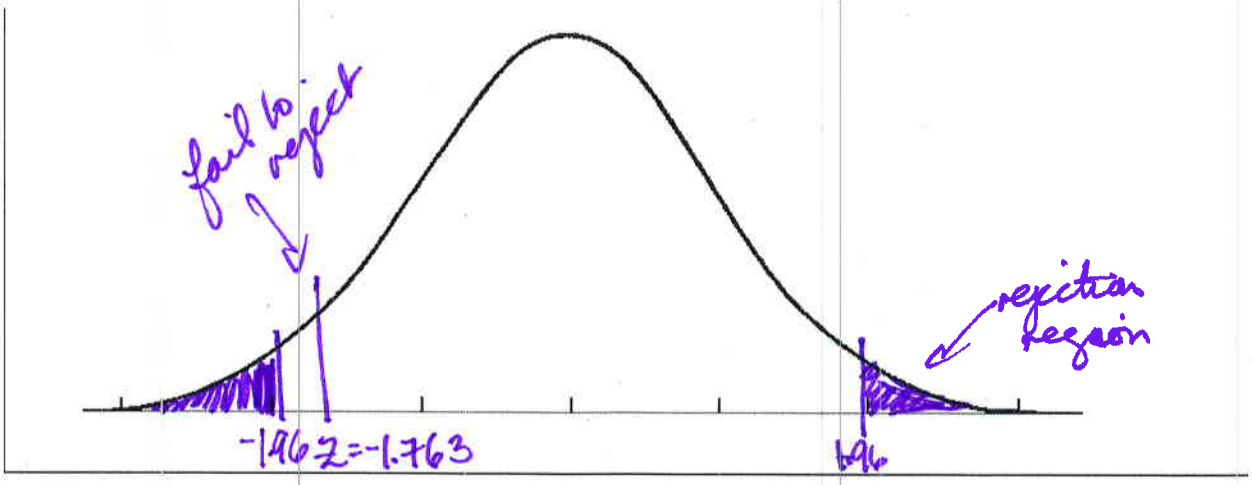
   $\frac{19}{30} = .63$

4. Conduct a hypothesis test to test whether the original assumption of a probability of $p_0 = 76.9\%$, or whether the alternative is not equal to this value. Label your hypotheses clearly and with correct notation.

   $H_0: p = 76.9\%$
   $H_a: p \neq 76.9\%$

   1PropZTest
   $p_0 = .769$
   $x = 19$
   $n = 30$
   $\rightarrow$ $z = -1.763$
   $p = .07789$

5. What is the z test statistic for your set? Draw the normal curve and mark your z-score on the curve in relation to a critical value of $z = \pm 1.96$ which is the z-score for a 0.05 significance level. Is your z-score in the rejection region?



$Z = -1.763$

6. What is your p-value? Is it above or below the significance level of 0.05?

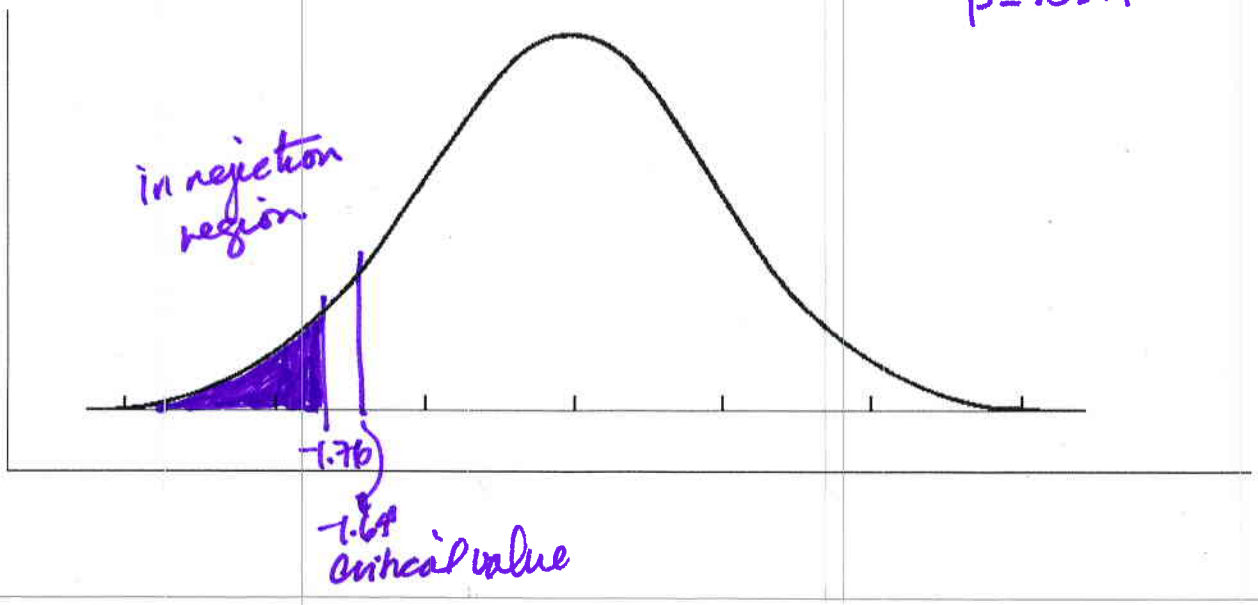
$p = .07789$ it is more

7. Do you reject the null hypothesis or fail to reject the null hypothesis?

fail to reject H_0

8. Redo the hypothesis test with an alternative hypothesis of $H_a: p < p_0$. Answer questions 5-7 again.

$p = .0389$



(8 continued here)

$p = .0389 < .05$

reject H_0 it does seem to be less than the assumed proportion

9. Check with your instructor to see if you have the bag of marbles that is different than the others or one of the bags that are the same as the others? Does it agree with the results of your test? If it does not agree, how do you explain what happened? What key statistical concepts are involved?

answers will vary

it's possible (though small) to have a bag of correct proportion but still reject H_0.

or to have the odd bag of marbles and fail to reject H_0.

variability + small sample size can lead to unexpected results from time to time.