

Math 10B with Professor Stankova

Quiz 12; Tuesday, 4/23/2019

Section #203; Time: 11 AM

GSI name: Roy Zhao

Name: _____

Circle True or False or leave blank. (1 point for correct answer, -1 for incorrect answer, 0 if left blank)

1. **TRUE** False If x is in the rejection region, then the p value for x is less than α .

Solution: The rejection region is all values of x that make us reject the null hypothesis (when p value is less than α).

2. True **FALSE** If H_0 is that there is no wolf, then the boy who cried wolf made a type 2 error.

Solution: He made a type 1 error.

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) (a) (4 points) The media says that 50% of the public think that Giannis should be the NBA MVP. To test their claim, you ask 9 people who they think should win and 8 of them want Giannis to win. If your alternative hypothesis is that more than half like Giannis, without using CLT, explicitly compute the p value for this hypothesis test. You may leave your answer as a fraction.

Solution: The null hypothesis is that $p = 0.5$ and the alternative hypothesis is that $p > 0.5$. We want to compute the probability we are even further from the mean which is $P(X \geq 8) = P(X = 8) + P(X = 9)$ for a binomial distribution with $p = 0.5$ and $n = 9$ which gives

$$\binom{9}{8} \frac{1}{2^8} \cdot \frac{1}{2} + \binom{9}{9} \frac{1}{2^9} \frac{1}{2} = \frac{9+1}{2^9} = \frac{5}{2^8}.$$

- (b) (6 points) Now suppose that you ask 100 people and 60 of them want Giannis to win. Use a two-sided alternative hypothesis with $\alpha = 0.05$. Can you reject the media's claim? (Hint: $z(2) = 0.4773$)

Solution: We have $p = 0.5$ and $\sigma = \sqrt{p(1-p)} = 0.5$. Then $\sigma_0 = \frac{\sigma}{\sqrt{n}} = \frac{0.5}{\sqrt{100}} = 0.05$. The p value is $P(X \geq 0.6) = \frac{1}{2} - z\left(\frac{0.6-0.5}{0.05}\right) = 0.5 - z(2) = 0.0227 < \alpha/2$. We compare to $\alpha/2$ because it is 2 sided. Therefore, we reject the null hypothesis.