

DUE: 4/24/2012

- 1) You are in charge of analyzing focus group results for a television show pilot that recently aired. The show is very expensive to produce and requires more than a 75% favorability rating to get the go ahead. Your focus group consisted of 100 individuals, of which 82 reported a favorable score.

- a. What are your null and alternative hypotheses?

$$H_0: p = .75 \quad H_a: p > 0.75$$

- b. What is the interpretation of a Type II error in this situation?

Determining that there is not enough evidence to conclude the proportion of viewers who will like the show is greater than 75%, when in reality more than 75% would like the show. Therefore, we would choose not to produce a profitable show.

- c. Find the test statistic (Z) for your current sample.

$$\hat{p} \sim N(0.75, 0.043) \quad Z = \frac{0.82 - 0.75}{0.043} = 1.63$$

- 2) You are in charge of testing the average 0 to 60 time of a new car. It is believed that the standard deviation of times is 0.65 seconds. In a sample of 40 runs, the average 0 to 60 time was 3.37 seconds. You are testing the null hypothesis (H_0) that the average 0 to 60 time is 3.5 seconds vs. the alternative hypothesis (H_a) that the average 0 to 60 time is faster than 3.5 seconds.

- a. A critical value of 3.4 seconds is proposed. Under that critical value, make a decision based on your sampled value of 3.37 seconds and write a sentence interpreting that decision.

Decision: Reject the Null Hypothesis

Based on a 3.4 second critical value, there is sufficient evidence to show that the average 0 to 60 time for the car is less than 3.5 seconds.

- b. Calculate α (Probability of Type I Error) based on the critical value proposed in a.

$$\bar{x} \sim N(3.5, 0.103) \rightarrow \frac{3.4 - 3.5}{0.103} = -0.97 \rightarrow \alpha = 0.1660$$

- c. What is the p-value associated with your sampled statistic of 3.37 seconds?

$$p - \text{value} = P(\bar{x} < 3.37) \rightarrow \frac{3.37 - 3.5}{0.103} = -1.26 \rightarrow p - \text{value} = 0.1038$$

- 3) Conduct a formal hypothesis test at the 1% level to test if the proportion of students at a Stony Brook college football game is different from the believed proportion of 80%. A sample of 28 individuals was taken where 60% were students.

0. **Assumptions:** $np \geq 5$ / $n(1-p) \geq 5 \rightarrow 28 * 0.80 = 22.4$ / $28 * 0.20 = 5.6$

1. $H_0: p = 0.80$ $H_a: p \neq 0.80$

2. $\alpha = 0.01$

3. $\hat{p} \sim N(0.80, 0.076)$ $Z = \frac{0.60-0.80}{0.076} = -2.63$

4. $P\text{value} = 2 * 0.0043 = 0.0086$

5. **Decision:** Reject H_0

At the 1% level, there is sufficient evidence to conclude that the true proportion of students at a Stony Brook college football game is different than 80%.