

## Regular Statistics Unit 4 Review

Name \_\_\_\_\_

- \_\_\_ 1. We have calculated a 95% confidence interval and would prefer for our next confidence interval to have a smaller margin of error without losing any confidence. In order to do this, we can
- I. change the  $z^*$  value to a smaller number.
  - II. take a larger sample.
  - III. take a smaller sample.
- A) I only      B) II only      C) III only      D) I and II      E) I and III
- \_\_\_ 2. Which is true about a 98% confidence interval for a population proportion based on a given sample?
- I. We are 98% confident that other sample proportions will be in our interval.
  - II. There is a 98% chance that our interval contains the population proportion.
  - III. The interval is wider than a 95% confidence interval would be.
- A) None      B) I only      C) II only      D) III only      E) I and II
- \_\_\_ 3. We have calculated a confidence interval based on a sample of size  $n = 100$ . Now we want to get a better estimate with a margin of error that is only one-fourth as large. How large does our new sample need to be?
- A) 25      B) 50      C) 200      D) 400      E) 1600
- \_\_\_ 4. A certain population is bimodal. We want to estimate its mean, so we will collect a sample. Which should be true if we use a large sample rather than a small one?
- I. The distribution of our sample data will be more clearly bimodal.
  - II. The sampling distribution of the sample means will be approximately normal.
  - III. The variability of the sample means will be smaller.
- A) I only      B) II only      C) III only      D) II and III      E) I, II, and III
- \_\_\_ 5. The manager of an orchard expects about 70% of his apples to exceed the weight requirement for "Grade A" designation. At least how many apples must he sample to be 90% confident of estimating the true proportion within  $\pm 4\%$ ?
- A) 19      B) 23      C) 89      D) 356      E) 505
- \_\_\_ 6. A  $P$ -value indicates
- A) the probability that the null hypothesis is true.
  - B) the probability that the alternative hypothesis is true.
  - C) the probability the null is true given the observed statistic.
  - D) the probability of the observed statistic given that the null hypothesis is true.
  - E) the probability of the observed statistic given that the alternative hypothesis is true.

- \_\_\_ 7. A statistics professor wants to see if more than 80% of her students enjoyed taking her class. At the end of the term, she takes a random sample of students from her large class and asks, in an anonymous survey, if the students enjoyed taking her class. Which set of hypotheses should she test?
- A)  $H_0 : p < 0.80$   
 $H_A : p > 0.80$       B)  $H_0 : p = 0.80$   
 $H_A : p > 0.80$       C)  $H_0 : p > 0.80$   
 $H_A : p = 0.80$       D)  $H_0 : p < 0.80$   
 $H_A : p \neq 0.80$       E)  $H_0 : p = 0.80$   
 $H_A : p < 0.80$
- \_\_\_ 8. Not wanting to risk poor sales for a new soda flavor, a company decides to run one more taste test on potential customers, this time requiring a higher approval rating than they had for earlier tests. This higher standard of proof will increase
- I. the risk of Type I error    II. the risk of Type II error    III. power
- A) I only      B) II only      C) III only      D) I and II      E) I and III
- \_\_\_ 9. Suppose that a manufacturer is testing one of its machines to make sure that the machine is producing more than 97% good parts ( $H_0 : p = 0.97$  and  $H_A : p > 0.97$ ). The test results in a  $P$ -value of 0.122. Unknown to the manufacturer, the machine is actually producing 99% good parts. What probably happens as a result of the testing?
- A) They correctly fail to reject  $H_0$ .  
 B) They correctly reject  $H_0$ .  
 C) They reject  $H_0$ , making a Type I error.  
 D) They fail to reject  $H_0$ , making a Type I error.  
 E) They fail to reject  $H_0$ , making a Type II error.
- \_\_\_ 10. Which of the following is true about Type I and Type II errors?
- I. Type I errors are always worse than Type II errors.  
 II. The severity of Type I and Type II errors depends on the situation being tested.  
 III. In any given situation, the higher the risk of Type I error, the lower the risk of Type II error.
- A) I only      B) II only      C) III only      D) I and III      E) II and III
11. **Approval rating** The President's job approval rating is always a hot topic. Your local paper conducts a poll of 100 randomly selected adults to determine the President's job approval rating. A CNN/USA Today/Gallup poll conducts a poll of 1010 randomly selected adults. Which poll is more likely to report that the President's approval rating is below 50%, assuming that his actual approval rating is 54%? Explain.

12. **Cereal** A box of Raspberry Crunch cereal contains a mean of 13 ounces with a standard deviation of 0.5 ounce. The distribution of the contents of cereal boxes is approximately Normal. What is the probability that a case of 12 cereal boxes contains a total of more than 160 ounces?

13. **Exercise** A random sample of 150 men found that 88 of the men exercise regularly, while a random sample of 200 women found that 130 of the women exercise regularly.
- a. Based on the results, construct and interpret a 95% confidence interval for the difference in the proportions of women and men who exercise regularly.

- b. A friend says that she believes that a higher proportion of women than men exercise regularly. Does your confidence interval support this conclusion? Explain.

14. **Internet access** A recent Gallup poll found that 28% of U.S. teens aged 13-17 have a computer with Internet access in their rooms. The poll was based on a random sample of 1028 teens and reported a margin of error of  $\pm 3\%$ . What level of confidence did Gallup use for this poll?

15. **Sleep** Do more than 50% of U.S. adults feel they get enough sleep? According to Gallup's December 2004 Lifestyle poll, 55% of U.S. adults said that that they get enough sleep. The poll was based on a random sample of 1003 U.S. adults. Test an appropriate hypothesis and state your conclusion in the context of the problem.

Also complete the following textbook problems:  
Pg. 523-528 #4, 11, 12, 14, 18, 20, 24, 30, 36, 37