**STA108 Chapters 16,17**

**Choose the best answer.**

1. A level 0.95 confidence interval is

a. any interval with margin of error ± 0.95.

 b. a range of values computed from sample data that will contain the true value of the parameter of interest 95% of the time.

c. a range of values with margin of error ± 0.95, which is also correct 95% of the time.

d. a range of values computed from sample data by a method that guarantees that the probability the interval computed contains the parameter of interest is 0.95.

2. The time (in number of days) until maturity of a certain variety of tomato plant is Normally distributed with mean ** and standard deviation ** = 2.4. I select a simple random sample of four plants of this variety and measure the time until maturity. The sample yields  = 65.

A 95% confidence interval for **, in days, is

 a. 65.00 ± 1.97.

 b. 65.00 ± 2.35.

 c. 65.00 ± 3.95.

 d. 65.00 ± 4.70.

3. I collect a random sample of size n from a population and from the data collected compute a 95% confidence interval for the proportion I observe from the population. Which of the following would produce a new confidence interval with smaller width (smaller margin of error) based on these same data?

a. Use a larger confidence level.

 b. Use a smaller confidence level.

c. Use the same confidence level, but compute the interval n times. Approximately 5% of these intervals will be larger.

d. Nothing can guarantee absolutely that you will get a smaller interval. One can only say the chance of obtaining a smaller interval is 0.05.

4. A 95% confidence interval for the mean hours freshmen spent on social media per day was calculated to be (2.5 hrs, 3.1 hrs). The confidence interval was based on an SRS of size n = 50. The margin of error is given by

a. 0.30.

b. 1.96.

c. 0.60.

 d. 0.40.

5. Veterinary researchers at a major university veterinary hospital calculated a 99% confidence interval for the average age of horses admitted for laminitis, a foot disease that leaves the horse severely lame, as 6.3 to 7.4 years. Based on this information we conclude that

a. 99% of all horses admitted for laminitis are between 6.3 and 7.4 years old.

b. we can be 100% sure that the average age of horses admitted with laminitis is between 6.3 and 7.4 years.

 c. we are 99% confident that the true mean age of horses with laminitis is between 6.3 and 7.4 years old.

d. All of the above.

6. To assess the accuracy of a laboratory scale, a standard weight known to weigh 1 gram is repeatedly weighed a total of *n* times, and the mean  of the weighings is computed. Suppose the scale readings are Normally distributed, with unknown mean ** and standard deviation ** = 0.01 g. How large should *n* be, so that a 95% confidence interval for ** has a margin of error of ± 0.0001?

 a. 100

 b.196

 c. 10,000

 d. 38,416

  7. Twenty-five seniors from a large metropolitan area school district volunteer to allow their Math SAT test scores to be used in a study.  These 25 seniors had a mean Math SAT score of  = 450.  Suppose we know that the standard deviation of the population of Math SAT scores for seniors in the district is ** = 100.  Assuming the population of Math SAT scores for seniors in the district is approximately Normally distributed, a 90% confidence interval for the mean Math SAT score ** for the population of seniors computed from these data is

1. Will not include the sample mean of 450.
2. Will include the SAT scores of 90% of all seniors in the district.
3. Is valid because a large sample was selected.
4. Is not trustworthy because the sample are not randomly selected

8. An SRS of size n0 was taken to estimate mean body mass index (BMI) for girls between 13 and 19 years of age. The 95% confidence interval obtained had lower limit 19.5 and upper limit 26.3. Which of the following is **NOT** true?

 a. A total of 95% of all teenage girls have BMI between 19.5 and 26.3.

b. The margin of error is 3.4.

c. The value z\* in the margin of error is 1.96.

d. A total of 95% of all SRS of size n0 contain the true mean BMI.

9.   A 99% confidence interval was calculated for a random sample of 64 tires of a particular brand in order to estimate the mean lifetime of all tires of that brand.  Suppose that the lifetimes for tires of this brand follow a normal distribution, with unknown mean ** and standard deviation ** = 5 kg. Suppose I had measured the lifetimes of a random sample of 100 tires rather than 64.  Which of the following statements is true?

      a. The margin of error for our 99% confidence interval would increase.

      b. The margin of error for our 99% confidence interval would decrease.

      c. The margin of error for our 99% confidence interval would stay the same since the level of confidence has not changed.

      d. ** would decrease.

10. All confidence intervals have the form

a. estimate + z\*standard error.

b. estimate  standard error.

c. estimate  z\*margin of error.

 d. estimate  margin of error.

11. The following is an acceptable statement of a null and alternative hypothesis for testing a hypothesis about a mean:

a. H0: µ = 10 vs Ha: µ > 10.

b. H0: µ = 10 vs Ha: µ < 10.

c. H0: µ = 10 vs Ha: µ ≠ 10.

 d. All of the above.

12. A certain population follows a Normal distribution, with mean ** and standard deviation

** = 2.5. You collect data and test the hypotheses

*H*0: ** = 1, *H*a: **  1

You obtain a *P*-value of 0.072. Which of the following is true?

 a. A 90% confidence interval for ** will exclude the value 1.

 b. A 90% confidence interval for ** will include the value 0.

 c. A 95% confidence interval for ** will exclude the value 1.

 d. A 95% confidence interval for ** will include the value 0.

13-15. A statistician wishing to test a hypothesis that students score more than 75% on the final exam in an introductory statistics course decides to randomly select 20 students in the class and have them take the exam early. The average score of the 20 students on the exam was 78% and the standard deviation in the population is known to be σ=15%.

13. The hypothesis the statistician wants to test is

a. H0: µ = 75 vs Ha: µ = 78.

b. H0: µ = 75 vs Ha: µ > 78.

 c. H0: µ = 75 vs Ha: µ > 75.

d. H0: µ = 75 vs Ha: µ < 75.

14. What would the corresponding z statistic be?

 a. 0.894

 b. 0.186

 c. 0.089

 d. 0.743

15. The p-value for this hypothesis is

 a. less than 0.16 greater than .025.

 b. less than .5 greater than .16

 c. less than .025.

 d. The answer cannot be determined with information provided

16. In a statistical test of hypotheses, we say the data are statistically significant at level ** if

 a. ** = 0.05.

 b. ** is small.

 c. the *P*-value is less than **.

 d. the *P*-value is larger than **.

17**.** The time (in number of days) until maturity of a certain variety of hot pepper is Normally distributed, with mean ** and standard deviation ** = 2.4. This variety is advertised as taking 70 days to mature. I wish to test the hypotheses *H*0: ** = 70, *H*a: ** > 70, so I select a simple random sample of four plants of this variety and measure the time until maturity. The four times, in days, are

 76 73 69 70

The calculated **P value** is .04779

Based on these data

 a. I would reject *H*0 at level 0.10 but not at level 0.05.

 b. I would reject *H*0 at level 0.05 but not at level 0.01.

 c. I would reject *H*0 at level 0.01.

 d. None of the above

18. The *P*-value of a hypothesis test is

 a. the probability, assuming the null hypothesis is true, that the test statistic will take a value at least as extreme as that actually observed.

 b. the probability, assuming the null hypothesis is false, that the test statistic will take a value at least as extreme as that actually observed.

 c. the probability the null hypothesis is true.

 d. the probability the null hypothesis is false.

19. You conduct a statistical test of hypotheses and find that the value of the test statistic is statistically significant at level ** = 0.05. You may conclude that

 a. the test would also be significant at level ** = 0.10.

 b. the test would also be significant at level ** = 0.01.

 c. both a and b are true.

 d. neither a nor b is true.

20. The simple conditions for making inference about a population mean include:

 a. our data (observations) are a simple random sample (SRS) from the population of interest.

 b. the variable we measure has an exact normal distribution.

 c. population standard deviation σ is known.

 d. all of the above.