

Practice A

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. You want to compute a 96% confidence interval for a population mean. Assume that the population standard deviation is known to be 10 and the sample size is 50. The critical value to be used in this calculation is
 - (a) 1.960
 - (b) 1.645
 - (c) 1.7507
 - (d) 2.0537
 - (e) None of the above. The answer is _____.

2. You have measured the systolic blood pressure of a random sample of 25 employees of a company located near you. A 95% confidence interval for the mean systolic blood pressure for the employees of this company is (122, 138). Which of the following statements gives a valid interpretation of this interval?
 - (a) Ninety-five percent of the sample of employees have a systolic blood pressure between 122 and 138.
 - (b) Ninety-five percent of the population of employees have a systolic blood pressure between 122 and 138.
 - (c) If the procedure were repeated many times, 95% of the resulting confidence intervals would contain the population mean systolic blood pressure.
 - (d) The probability that the population mean blood pressure is between 122 and 138 is 0.95.
 - (e) If the procedure were repeated many times, 95% of the sample means would be between 122 and 138.
 - (f) None of the above. The answer is _____.

3. An analyst, using a random sample of $n = 500$ families, obtained a 90% confidence interval for mean monthly family income for a large population: (\$600, \$800). If the analyst had used a 99% confidence level instead, the confidence interval would be:
 - (a) Narrower and would involve a larger risk of being incorrect
 - (b) Wider and would involve a smaller risk of being incorrect
 - (c) Narrower and would involve a smaller risk of being incorrect
 - (d) Wider and would involve a larger risk of being incorrect
 - (e) Wider but it cannot be determined whether the risk of being incorrect would be larger or smaller

4. In an opinion poll, 25% of a random sample of 200 people said that they were strongly opposed to having a state lottery. The standard error of the sample proportion is approximately
 - (a) 0.03
 - (b) 0.25
 - (c) 0.0094
 - (d) 6.12
 - (e) 0.06
 - (f) None of the above. The answer is _____.

5. In preparing to use a t procedure, suppose we were not sure if the population was Normal. In which of the following circumstances would we not be safe using a t procedure?
- (a) A stemplot of the data is roughly bell-shaped.
 - (b) A histogram of the data shows moderate skewness.
 - (c) A stemplot of the data has a large outlier.
 - (d) The sample standard deviation is large.
 - (e) The t procedures are robust, so it is always safe.
6. Some scientists believe that a new drug would benefit about half of all people with a certain blood disorder. To estimate the proportion of patients who would benefit from taking the drug, the scientists will administer it to a random sample of patients who have the blood disorder. What sample size is needed so that the 95% confidence interval will have a *width* of 0.06?
- (a) 748
 - (b) 1068
 - (c) 1503
 - (d) 2056
 - (e) 2401
7. In a poll, (a) some people refused to answer questions, (b) people without telephones could not be in the sample, and (c) some people never answered the phone in several calls. Which of these sources is included in the $\pm 2\%$ margin of error announced for the poll?
- (a) Only source (a).
 - (b) Only source (b).
 - (c) Only source (c).
 - (d) All three sources of error.
 - (e) None of these sources of error.
8. Researchers are studying yield of a crop in two locations. The researchers are going to compare two independent 90% confidence intervals for the mean yield in each location. The probability that *at least one* of the constructed intervals will cover the true mean yield at its location is
- (a) 0.81
 - (b) 0.19
 - (c) 0.99
 - (d) 0.95
 - (e) none of these

Practice B

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

- The heights (in inches) of males in the United States are believed to be Normally distributed with mean μ . The average height of a random sample of 25 American adult males is found to be $\bar{x} = 69.72$ inches, and the standard deviation of the 25 heights is found to be $s = 4.15$. The standard error of \bar{x} is
 - 0.17
 - 0.69
 - 0.83
 - 1.856
 - 2.04
- You want to estimate the mean SAT score for a population of students with a 90% confidence interval. Assume that the population standard deviation is $\sigma = 100$. If you want the margin of error to be approximately 10, you will need a sample size of
 - 16
 - 271
 - 38
 - 1476
 - None of the above. The answer is _____.
- Which of the following is an example of a paired data design?
 - A teacher compares the pretest and posttest scores of students.
 - A teacher compares the scores of students using a computer-based method of instruction with the scores of other students using a traditional method of instruction.
 - A teacher compares the scores of students in her class on a standardized test with the national average score.
 - A teacher calculates the average of scores of students on a pair of tests and wishes to see if this average is larger than 80%.
 - None of these.
- The Gallup Poll interviews 1600 people. Of these, 18% say that they jog regularly. The news report adds: "The poll had a margin of error of plus or minus three percentage points." You can safely conclude that
 - 95% of all Gallup Poll samples like this one give answers within $\pm 3\%$ of the true population value.
 - The percent of the population who jog is certain to be between 15% and 21%.
 - 95% of the population jog between 15% and 21% of the time.
 - We can be 3% confident that the sample result is true.
 - If Gallup took many samples, 95% of them would find that exactly 18% of the people in the sample jog.

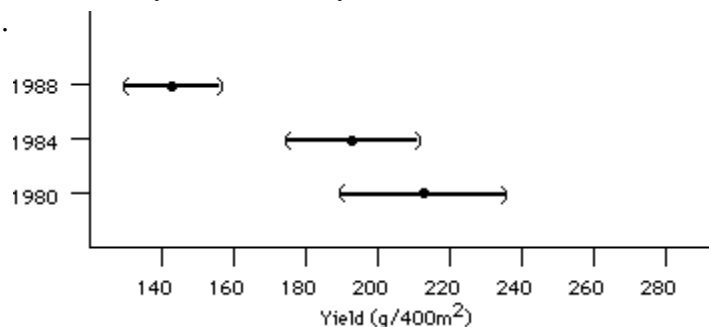
5. I collect a random sample of size n from a population and from the data collected compute a 95% confidence interval for the mean of the population. Which of the following would produce a new confidence interval with larger width (larger margin of error) based on these same data?

- (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) Increase the sample size.
- (e) Nothing can guarantee absolutely that you will get a larger interval. One can only say the chance of obtaining a larger interval is 0.05.

6. You want to design a study to estimate the proportion of students on your campus who agree with the statement “The student government is an effective organization for expressing the needs of students to the administration.” You will use a 95% confidence interval and you would like the margin of error to be 0.05 or less. The minimum sample size required is approximately

- (a) 22
- (b) 1795
- (c) 385
- (d) 271
- (e) None of the above. The answer is _____.

7. Consider the following graph of the mean yields of barley in 1980, 1984, and 1988 along with 95% confidence intervals.



Which of the following is INCORRECT?

- (a) Since the confidence intervals for 1984 and 1980 have considerable overlap, there is little evidence that the sample means differ.
 - (b) Since the confidence intervals for 1988 and 1980 do not overlap, there is good evidence that their respective population means differ.
 - (c) The sample mean for 1984 is about 195 g/400 m².
 - (d) The sample mean for 1988 is less than the sample mean for 1984.
 - (e) The estimate of the population mean in 1988 is more precise than that for 1980 since the confidence interval for 1988 is narrower than that for 1980.
8. The diameter of ball bearings is known to be Normally distributed with unknown mean and variance. A random sample of size 25 gave a mean of 2.5 cm. The 95% confidence interval had length 4 cm. Then
- (a) the sample variance is 4.86.
 - (b) the sample variance is 26.03.
 - (c) the population variance is 4.84.
 - (d) the population variance is 23.47.
 - (e) the sample variance is 23.47.

Practice B

Part 2: Free Response

Communicate your thinking clearly and completely.

9. A steel mill's milling machine produces steel rods that are supposed to be 5 cm in diameter. When the machine is in statistical control, the rod diameters vary according to a Normal distribution with mean $\mu = 5$ cm. A large sample of 150 rods produced by the machine yields a mean diameter of 5.005 cm and a standard deviation of 0.02 cm.
- Construct and interpret a 99% confidence interval for the true mean diameter of the rods produced by the milling machine.
 - Does the interval in (a) give you reason to suspect that the machine is not producing rods of the correct diameter? Explain your reasoning.
10. A survey of a random sample of 1280 student loan borrowers found that 448 had loans totaling more than \$20,000 for their undergraduate education.
- Construct and interpret a 90% confidence interval for the population proportion p .
 - Students reported the total amount of loans they had obtained for their undergraduate education. No attempt was made to verify the loan amounts reported by students. How might this information affect your interpretation of the result from (a)?
 - If you used this sample to construct a confidence interval for the *mean* amount of students' loans, could the resulting interval contain \$20,000? Justify your answer.