

Show your work or write down your calculator inputs for each problem.

Questions 1 - 5 are multiple choice. Circle the letter of the best response. [4 pts each]

1. A 95% confidence interval for the mean μ of a population is computed from a simple random sample. We may conclude
 - a) that 95% of the data are contained in the interval found.
 - b) that the interval found will contain μ 95% of the time.
 - c) that if we took many, many additional random samples and from each computed a 95% confidence interval for μ , approximately 95% of these intervals would contain μ .
 - d) that there is a 95% probability that any individual value from the population is contained in the interval found.

2. An event A will occur with probability 0.5. An event B will occur with probability 0.4. The probability that both A and B will occur is 0.2. We may conclude
 - a) that events A and B are independent.
 - b) that events A and B are disjoint.
 - c) that either A or B always occurs.
 - d) None of the above.

3. A confidence interval will decrease in width if:
 - a) Either the sample size increases or the confidence level increases.
 - b) Either the sample size increases or the confidence level decreases.
 - c) Either the sample size decreases or the confidence level increases.
 - d) Either the sample size decreases or the confidence level decreases.

4. The sampling distribution of a statistic is
 - a) the probability that we obtain the statistic in repeated random samples.
 - b) the mechanism that determines whether or not randomization was effective.
 - c) the extent to which the sample results differ systematically from the truth.
 - d) the distribution of values taken by a statistic in all possible samples of the same size from the same population.

5. The width of a confidence interval estimate for a proportion will be
 - a) wider when the sample proportion is 0.95 than when the sample proportion is 0.55.
 - b) wider for 90% confidence than for 95% confidence.
 - c) narrower for a sample size of 50 than for a sample size of 100.
 - d) narrower when the sample proportion is 0.10 than when the sample proportion is 0.45.

6. At a certain college, 75% of the students own a computer. Of the students that own a computer, 80% also own a cell phone. Of the students that do not own a computer, 52% own a cell phone. [9 pts]

a) What percent of all students own a computer and a cell phone?

b) What percent of all students do not own a computer and do not own a cell phone?

c) What percent of all students own a cell phone? [Hint: A Venn Diagram might be helpful to answer this question.]

7. A group of volunteers for a clinical trial consists of 81 women and 77 men. 18 of the women and 19 of the men have high blood pressure. [6 pts]

a) If one of the woman volunteers is selected at random find the probability that the person has high blood pressure.

b) If one of the volunteers with high blood pressure is selected at random find the probability that the person is a man.

8. The following table gives the percentages for the number of bedrooms per unit for low income housing according to the US Census Bureau. Find the mean number of bedrooms for low income housing units in the US. [5 pts]

Number of Bedrooms	1	2	3	4
Percent	3.4%	54.9%	39.3%	2.4%

9. In a diagnostic test for a certain disease, the sensitivity was 0.96 and the specificity was 0.93. Suppose the proportion of all those tested that had the disease was 0.03. [9 pts]
- a) What proportion of all those being tested have the disease and test positive?
 - b) What proportion of all those being tested do not have the disease and test positive?
 - c) What proportion of all those being tested test positive?
10. It is estimated that 60% of Americans that are 65 and older are women. Suppose this is true. Also suppose two Americans aged 65 and older are randomly selected. Find the probability of the following. [9 pts]
- a) Both people are women.
 - b) Both people are men.
 - c) One is a man and the other is a woman.
11. The lengths of newborn children in the United States vary according to a normal distribution with mean 19.5 inches and standard deviation 0.75 inches. To be in the highest 5% of lengths, above what length would a baby have to be? [4 pts]

12. According a Harris Poll, 23% of Americans own a cat. In each case, write down the values for n , p , and x . [10 pts.]

- a) If a random sample of 30 Americans is taken, what is the probability that exactly 10 of them own a cat?

n _____

p _____

x _____

- b) If a random sample of 30 Americans is taken, what is the probability that fewer than 10 of them own a cat?

n _____

p _____

x _____

13. Serum cholesterol is an important risk factor for coronary disease. The level of serum cholesterol is approximately normally distributed with a mean of 219 mg/dL and a standard deviation of 50 mg/dL. Serum cholesterol levels of over 250 mg/dL indicate a high-enough risk for heart disease to warrant treatment. [8 pts]

- a) What is the probability that a randomly selected person will have serum cholesterol levels of 250 mg/dL or higher?

- b) If 4 people are randomly selected, what is the probability that their mean serum cholesterol level will be 250 mg/dL or higher?

14. Suppose you are going to sample Hope students to find out what proportion plan on taking a vacation trip this summer. You plan on showing this proportion as a 95% confidence interval. You have no idea as to what your sample proportion will be. What is the smallest sample size you need so that the margin of error will be at most $\pm 10\%$? [4 pts]
15. In an October 5 poll, 46% of 600 likely voters said they plan to vote for Jennifer Granholm for governor. [8 pts]
- Find a 95% confidence interval for the proportion of all likely voters that plan to vote for Granholm.
 - What sample size is need so that the margin of error is at most 0.02? (Use the sample proportion given in your estimate.)
16. Heart rates, in beats per minute, were found from a random sample of 12 people. They were found to have a mean of $\bar{x} = 74.5$ and a standard deviation of $s = 8.71$. [8 pts]
- Find a 99% confidence interval for the mean number of beats per minute.
 - What is the margin of error for your confidence interval?