Answer all questions. Write legibly. Show your work wherever necessary for full credit.

1. For a population of five individuals, television ownership is as follows:

Name	Number of television sets owned
Allen	2
Betty	1
Chuck	3
Dave	4
Eddie	2

a. Calculate the population mean and the population standard deviation.

b. For the sample size n = 2, create the sampling distribution of the mean.

c. Calculate the expected mean and the standard error for the sampling distribution.

2. A civic organization includes 200 members, who have an average income of $58,000, with a standard deviation of $10,000. A simple random sample of n = 30 members is selected to participate in the annual fund-raising drive.

What is the probability that the average income of the fund-raising group will be

a. at least $60,000?

b. between $56,000 and $60,000?

c. no more than $58,000?

3. For each of the following confidence levels (CL), determine α (total tail probability), the t-values at the given degrees of freedom, and the corresponding z-value:

CL	α	$t_{df=1}$	$t_{df=50}$	$t_{df=100}$	z-value
0.80					
0.90					
0.95					
0.98					
0.99					

4. For a random variable that is normally distributed, with μ = 200 and σ = 20, determine the probability that a simple random sample of 4 items will have a mean that is:

a. greater than 210 b. between 190 and 230 c. less than 225.

5. According to the US Census Bureau, 85% of adult residents of Oklahoma have completed high school.

What is the probability that no more than 80% of persons in a simple random sample of 200 adult residents of Oklahoma have finished high school?

6. Of the 629 passenger vehicles imported by the small country of Malta in a recent year, 117 were Volvos. A simple random sample of 300 imported passenger vehicles is taken.

What Is the probability that at least 15% of the vehicles in this sample will be Volvos?

7. A simple random sample of 30 has been collected from a population for which it is known that σ = 10.0. The sample mean has been calculated as 240.0.

Construct and interpret the 90% and 95% confidence intervals for the population mean. In each case, note the size of the sampling error.

8. From past experience, the population standard deviation of rod diameters produced by a machine has been found to be σ = 0.053 inches. For a simple random sample of n=30 rods, the average diameter is found to be $\bar{x}$ = 1.400 inches.

What is the 95% confidence interval for the population mean and the accuracy?

9. A simple random same of n=90 manufacturing employees has been selected from those working throughout a state. The average number of overtime hours worked last week was $\bar{x}$ = 8.46 hours with a sample standard deviation of s = 3.61 hours.

What is the 98% confidence interval for the population mean?

10. A simple random sample of 33 owners of a certain model of automobile were asked how many defects had to be corrected within the first six months of ownership. The sample showed an average of 3.7 defects, with a sample standard deviation of 1.8 defects.

a. Construct a 95% confidence interval for μ = the average number of defects.

What is the size of the accuracy?

b. Assume that the sample size increases to 120, and the sample average and standard deviation remain the same. Construct a 95% confidence interval for μ.

What is the size of the accuracy?

11. In a large industry where well over 100,000 employees are represented by a single union, a simple random sample of 100 union members finds that 57% of those in the sample intend to vote for the new labor contract. What is the 99% confidence interval for the population proportion of employees who intend to vote for the labor contract?

12. A marketing manager wants to estimate the population mean usage of home heating oil within 50 gallons of the true value. On the basis of a study taken in the previous year, he believes that the standard deviation is 325 gallons. What is the sample size needed to estimate the population mean at the 95% confidence level?

13. A tourist agency would like to determine the proportion of U.S. adults who have ever vacationed in Mexico. What sample size is necessary to have 95% confidence that the sample proportion will be within 0.03 (3 percentage points) of the actual population proportion?