1. For a particular brand of TV picture tube, it is known that the mean operating life of the tubes is $\mu$ = 9000 hr with a standard deviation of 500 hr. Determine the expected value and standard error of the sampling distribution of the mean given a sample size of n = 25. Interpret the meaning of the computed values.

2. An auditor takes a random sample of size n=36 from a population of 1000 accounts receivable. The means value of the accounts receivable for the population is $\mu$ = \$260.00 with the population standard deviation = \$45.00.
   (a) What is the probability that the sample mean will be less than \$250.00 ?
   (b) What is the probability that the sample mean will be within \$15.00 of the population mean?

3. For a large population of normally distributed account balances, the mean balance is $\mu$ = 150.00 with standard deviation = \$35.00.
   (a) What is the probability that one randomly sampled account has a balance that exceeds \$160.00 ?
   (b) What is the probability that the mean for a random sample of n = 40 accounts will exceed \$160.00 ?

4. Suppose that the standard deviation of the tube life of a particular brand of TV picture tube is known to be 500, the population of tube life cannot be assumed to be normally distributed. However, the sample mean of $\bar{x}$ = 8900 is based on a sample of n = 35. Construct the 95% confidence interval for estimating the population mean.

5. A marketing research analyst collects data for a random sample of 100 customers out of the 400 who purchased a particular "coupon special". The 100 people spent an average of $\bar{x}$ = \$24.57 in the store with a standard deviation of \$6.60. Using a 95% confidence interval, estimate
   (a) the mean purchase amount for all 400 customers.
   (b) the total dollar amount of purchases by the 400 customers.

6. For a sample of 50 firms taken from a particular industry the mean number of employees per firm is 420.4 with a sample standard deviation of 55.7. There is a total of 380 firm in this industry.
   (a) determine the standard error of the mean to be used in conjunction with estimating the population mean by a confidence interval.
   (b) determine the 90 % confidence interval for estimating the average number of workers per firm in the industry.

7. A prospective purchaser wishes to estimate the mean dollar amount of sales per customer at a toy store located at an airlines terminal. Based on data from other similar airports, the standard deviation of such sales amount is estimated to be about \$3.20.
   What size of random sample should she collect, as a minimum, if she wants to estimate the mean sales amount within \$1.00 and with 99 percent confidence?

8. From historical records, the standard deviation of the sales per retail outlet for a consumer product is known to be \$200, and the population of sales amounts per outlet is assumed to be normally distributed. What is the minimum sample size required to estimate the mean sales per outlet within \$100 and with 95% confidence?

9. Suppose that you wish to estimate the mean sales amount per retail outlet for a particular consumer product during the past year. The number of retail outlet is large. Determine the 95% confidence interval given that the sales amounts are assumed to be normally distributed.

$\bar{x}$ = \$3425, $\sigma$ = \$2000, and n = 25.

10. The mean diameter of a sample of n = 12 cylindrical rods included in a shipment is 2.350 mm with a standard deviation of 0.050 mm. The distribution of the diameters of all the rods included in the shipment is assumed to be approximately normal. Determine the 90 percent interval for estimating the mean diameter of all of the rods included in the shipment.

11. A food manufacturer wishes to estimate the average time required to process orders received from supermarkets. A random sample of 60 orders revealed a mean time of 2.4 days and a standard deviation of 1.2 days.
    (i) Compute a 95% confidence interval for the population mean process time.
    (ii) If the manufacturer wishes to be within 0.2 days of the true average time, what size sample should be drawn ?

12. A marketing research firm contacts a random sample of 100 men in a large community and finds that a sample proportion of 0.40 prefer the razor blades manufactured by the client firm to all other brands. Determine the 95 % confidence interval for the proportion of all men in the community who prefer the client firm's razor blades.

13. A college administrator collects data on a nationwide random sample of 230 students enrolled in graduate programs in business administration, and finds that 54 of these students have undergraduate degrees in business. Estimate the proportion of such students nationwide who have undergraduate degrees in business administration, using a 90 percent confidence interval.

14. In a large metropolitan area in which a total of 800 gasoline service stations are located, for a random sample of n = 36 stations, 20 of them carry a particular nationally advertised brand of oil. Using a 95 % confidence interval estimate;
    (a) the proportion of all stations in the area which carry the oil and
    (b) the total number of service stations in the area which carry the oil.

15. A university administrator wishes to estimate the proportion of students enrolled in graduate programs in business administration who also have undergraduate degree in business administration within ± 0.05 and with 90% confidence. What sample size should he collect, as a minimum, if there is no basis for estimating the approximate value of the proportion before the sample is taken?

**Answers:**

1) 9000, 100
2) (a) 0.09121 (b) 0.9545
3) (a) 0.38755 (b) 0.03538
4) (8734.3, 9065.7)
5) (a) (23.45, 25.69) (b) 9828
6) (a) 7.35 (b) (408.31, 432.49)

7) 68
8) 16
9) ($2641, $4209)
10) (2.324mm, 2.376mm)
11) (i) (2.096 days, 2.704 days) (ii) 139
12) (0.304, 0.496)
13) (0.189, 0.281)
14) (a) (0.397, 0.714) (b) 444
15) 271