1) A random sample of 14 evenings (6 to 9 P.M.) at the O’Sullivan household showed the family received an average of \( \bar{x} = 5.2 \) solicitation phone calls each evening. The standard deviation was \( s = 1.9 \). Find a 95% confidence interval for the population mean number of solicitation calls this family receives each night. Write a brief explanation of the meaning of the confidence interval in the context of this problem.

2) Jordan is the manager of a used book store. He wants to estimate the average amount a customer spends per visit. A random sample of 80 customer receipts gave a mean of \( \bar{x} = 6.90 \) with standard deviation \( s = 2.45 \).

   a) Find a 90% confidence interval for the average amount spent by all customers.

   b) For a day when the book store had 80 customers, use part (a) to estimate a range of dollar values for the total income on that day.

3) Ms. Davis has assigned a term paper due at the end of the semester. She would like to know the average length of the paper. The data below are the numbers of typed pages from a random sample of 10 term papers. Use these data to create a 95% confidence interval for the population mean length of all term papers for his class. \( \bar{x} = 14.7 \) and \( s = 5.31 \).
4) Computer Depot is a large store that sells and repairs computers. A random sample of 110 computer repair jobs took technicians an average of $\bar{x} = 93.2$ minutes per computer. Assume that $\sigma$ is known to be 16.9 minutes. Find a 99% confidence interval for the population mean time $\mu$ for computer repairs. Write a brief explanation of the meaning of the confidence interval in the context of this problem.

5) A random sample of 56 credit-card holders showed that 41 regularly paid their credit-card bills on time.
   
   a) Let $p$ represent the proportion of all people who regularly paid their credit-card bills on time. Find a point estimate $\hat{p}$ for $p$.

   b) Find a 95% confidence interval for $p$.

   c) How many more credit-card holders should be included in the sample to be 95% sure that a point estimate $\hat{p}$ will be within a distance of 0.05 from $p$?
6) Allen is an appliance salesman who works on commission. A random sample of 39 days showed that the sample standard deviation value of sales was \( s = $215 \). How many more days should be included in the sample to be 95% sure that the population mean \( \mu \) is within $50 of the sample mean?

7) What percentage of male athletes wears contact lenses during performances? Let \( p \) be the proportion of male athletes who wear contact lenses.

   a) If you have no preliminary estimate for \( p \), how many male athletes should you include in a random sample to be 90% sure that the point estimate \( \hat{p} \) will be within a distance of 0.05 from \( p \).

   b) Studies show that approximately 19% of male athletes wear contact lenses during performances. Answer part (a) using this estimate for \( p \).

8) At a large office supply store, the daily sales of two similar brand-name laser printers are being compared. A random sample of 16 days showed that brand I had mean daily sales \( \bar{x}_1 = $2464 \) with standard deviation \( s_1 = $529 \). A random sample of 19 days showed that brand II had mean daily sales \( \bar{x}_2 = $2285 \) with sample standard deviation \( s_2 = $440 \). Assume that sales follow an approximately normal distribution.

   a) Find a 90% confidence interval for the population mean difference in sales \( \mu_1 - \mu_2 \).

   b) Explain the confidence interval of the mean sales of one printer compared with that of the other?
9) A production manager is studying the effect of overtime on different shifts. On the morning shift, at least half the workers were on overtime. A random sample of 245 items from the assembly line showed that 24 were defective. Midshift had no overtime workers. A random sample of 258 items from the assembly line showed that 11 had defects.

a) Find a 90% confidence interval for the population proportion difference $p_1 - p_2$ of defective items for the morning shift versus midshift.

b) Explain the confidence interval of the population proportion of defects for the morning shift compared with midshift?

10) Red Stone Tires has developed a new tread that the company claims reduces stopping distance on wet pavement. A random sample of 56 test drives with cars using tires with the old tread type showed that the average stopping distance on wet pavement was $\bar{x}_1 = 183$ feet. A random sample of 61 test drives conducted under similar conditions but with cars using tires with the new tread type showed that the average stopping distance was $\bar{x}_2 = 153$ feet. Historical data suggest that $\sigma_1 = 49$ feet and $\sigma_2 = 53$ feet.

a) Find a 90% confidence interval for the population mean difference $\mu_1 - \mu_2$ of stopping distances for the two types of tire tread.

b) Explain the confidence interval of the mean stopping distance using tires with the new tread design compared to those using tires with the old tread design?