1. A random sample of \( n = 50 \) observations from a quantitative population produced \( \bar{x} = 56.4 \) and \( s^2 = 2.6 \). Give the point estimate for the population mean \( \mu \), and calculate the margin of error.

2. Suppose water samples from 40 rainfalls are analyzed for pH, and \( \bar{x} \) and \( s \) are equal to 3.7 and 0.5, respectively. Find a 99% confidence interval for the mean pH in rainfall and interpret the interval. What assumption must be made for the confidence interval to be valid?

3. Suppose you wish to estimate a population mean based on random sample of \( n \) observations, and prior experience suggests that \( \sigma = 12.7 \). If you wish to estimate \( \mu \) correct to within 1.6, with probability equal to 0.90, how many observations should be included in your sample?

4. A botanist wants to estimate the minima number of trees in a jungle near to Malaysia National Park. How many of the trees per acre should be checked if he wants 95% confidence that the differences between sample and population means is within 3 trees per acre. From previous experience \( \sigma^2 = 12 \) trees per acre.

5. In a group of 500 male adults who drink coffee, 240 of them like Brand A’s coffee.
   (a) Find a point estimate for the proportion of adults who like to drink Brand A’s coffee, and find the margin of error for your estimator.
   (b) Find a 90% confidence interval for the proportion of adults who like to drink Brand A’s coffee. Interpret this interval.

6. A major local newspaper selected a simple random sample of 400 readers from their list of 10,000 subscribers. They asked whether the paper should increase its coverage of local news. The survey reported that 54% of the sample wanted more local news. What is the 95% confidence interval for the proportion of readers who would like more coverage of local news?
7. A large local restaurant management conducts a study to find the amount spent on lunch at one of their branches. Random samples of 50 men and 100 women were gathered. For men, the average expenditure was RM20 with a standard deviation of RM3. For women, it was RM15 with a standard deviation of RM2. Assume that the two populations are independent and normally distributed.

(a) Let $\mu_1$ and $\mu_2$ be the mean lunch expenditures for men and women. What are the point estimate of $\mu_1 - \mu_2$ and its margin of error?

(b) Find a 99% confidence interval for the lunch spending difference between men and women. Interpret the interval.

8. The KFC, one of the fast food restaurant with its famous and delicious fried chicken offers two kinds of choices; original and spicy. A bucket of 56 original KFC fried chicken selected at random contained 12 chicken wings and another bucket of 32 spicy KFC fried chicken contained 8 chicken wings. Construct a 95% confidence interval for the difference in the proportions of chicken wings for KFC original and spicy flavors.

9. The mean and standard deviation for the time taken to exercise in a day of randomly selected 16 UPM students are 13 and 3 minutes respectively. Find the 90% confidence interval for the true mean time taken to exercise in a day by the UPM students.

10. A sample of 15 jars of Brand A coffee gave mean amount of caffeine of 80mg per jar with standard deviation of 5mg. Another sample of 12 jars of Brand B coffee gave the mean amount of caffeine of 77mg per jar with standard deviation of 6mg. Construct a 95% confidence interval for the difference between the mean amounts of caffeine per jar of these two brands of coffee for these two cases:

(a) Assume the two populations are normally distributed and have equal variance.

(b) Assume the two populations are normally distributed and have unequal variance.

11. An auto manufacturing company, Proton wants to estimate the variance of miles per gallon for its auto model, Myvi. A random sample of 22 cars of this model showed that the variance of miles per gallon for these cars is 0.62. Find the 95% confidence interval for the population variance and standard deviation. Assume that the miles per gallon for all such cars are (approximately) normally distributed.