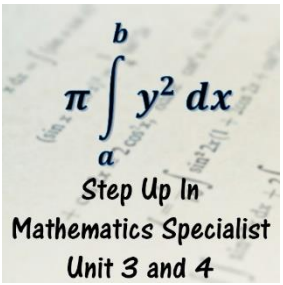
6.3 Confidence Intervals for Means

Problems Worksheet



1. Thirty households selected at random took part in a study of water consumption habits. Each reported their total usage in kilolitres for the June quarter of 2018. Average usage was 32 kL. A much larger study from 2017 found a standard deviation of 5 kL. Assume the usage is normally distributed.

    a. Determine a 90% confidence interval for the mean usage in the June quarter of 2018 and state its meaning.

    b. Determine a 95% confidence interval for the mean usage in the June quarter of 2018.

    c. Compare the size of the intervals in (a) and (b) and justify the difference between them.

2. A sample of 22 students taking a particular statistics class were anonymously polled on the number of hours spent studying for their final exam. The data was to be used to infer the study habits of all students taking the course. Given the data below of hours of study per student, construct a 90% confidence interval for the population of students.

14	12	10	26	8	7	13	9	8	13	14
5	16	22	28	10	17	21	17	11	16	11

3. A random sample of 150 people were asked their gross annual incomes. They gave responses with an average of \$73 000 and standard deviation of $\$9\ 000$. Based on this, determine 90%, 95% and 99% confidence intervals for the population mean annual gross income. State the bounds of each interval to the nearest dollar.

4. A selection of test tubes is tested to determine the number of times they can be heated before cracking. A normal distribution with a mean of 1200 hours and standard deviation of 90 hours was determined.

    a. Determine the minimum sample size that must be taken in order to be 95% confident that the sample mean lies within ten hours of the population mean.

    b. Determine the minimum sample size that must be taken in order to be 99% confident that the sample mean lies within ten hours of the population mean.

    c. Determine the minimum sample size that must be taken in order to be 99% confident that the sample mean lies within five hours of the population mean.

    d. State why your answer to (c) is larger than your answer to (b).

5. A random variable is known to be normally distributed with a standard deviation of 24. A sample of size 20 is drawn from this population and a confidence interval of $303.12 < \mu < 316.88$ is established. Determine what percentage confidence interval this represents.