

MATHEMATICS 360-255-LW

Quantitative Methods II

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IX – Estimating μ (known σ)

1. A random sample of 150 college students was taken, where each was asked for the number of hours per week they work at a paid job outside of school. A mean of 12.41 hours worked per week was obtained. Construct a 95% confidence interval for the mean number of hours worked per week by college students, assuming that the population standard deviation is 7.3 hours.
2. Twenty randomly selected college students were asked how many cavities they had. A mean of 3.21 cavities was obtained. Construct a 99% confidence interval for the mean number of cavities for all college students, assuming that the number of cavities is normally distributed, and that $\sigma = 1.65$.
3. How large are math classes in CEGEP's? A random sample of 100 math classes had a mean of 28.3 students. Assuming that $\sigma = 4.5$ students, construct a 92% confidence interval for the mean class size for all CEGEP math classes.
4. A survey of Canadians planning a summer vacation in 2009 revealed a mean planned expenditure of \$3048. Assume that this mean is based on a random sample of 300 Canadians who were planning summer vacations in 2009. Previous studies have shown that the population standard deviation is \$710. Construct a 99% confidence interval for the mean planned expenditure by all Canadians taking a summer vacation in 2009.
5. Do people who stop smoking tend to gain weight? A study (later published in a medical journal) was undertaken to answer this question. The authors of this study collected data on a random sample of 15 men over the age of 35 who had quit smoking during the past 10 years and found that these men had gained an average of 5.28 kilograms since quitting smoking. Assuming that weight gains are normally distributed with a population standard deviation of 0.59 kilogram, construct a 98% confidence interval for the corresponding population mean.
6. The CAA estimated that Canadians planned to spend an average of 4.83 nights away on vacation in 2008. Suppose that this mean was based on a sample of 24 Canadians who planned vacations, that the population standard deviation was 1.52 nights, and that the number of nights is normally distributed. Construct a 97% confidence interval for the mean length of vacations Canadians planned in 2008.
7. A random sample of 60 night school students' ages is obtained in order to estimate the mean age of night school students. If the sample mean is 25.3 years, construct a 95% confidence interval for the mean age of night school students, assuming $\sigma = 4$ years.

8. A high-tech company wants to estimate the mean number of years of college education its employees have completed. A good estimate of the standard deviation for the mean number of years of college is 1.0. How large a sample needs to be taken to estimate μ to within one quarter of a year with 99% confidence?
9. A researcher wants to determine a 95% confidence interval for the mean number of hours that high school students spend doing homework per week. A preliminary study showed that the standard deviation for hours spent per week by all high school students doing homework is 0.7. How large a sample should the researcher select so that the estimate will be within 0.15 hours of the population mean?
10. A department store manager wants to estimate at a 90% confidence level the mean amount spent by all customers at this store. From an earlier study, the manager knows that the standard deviation of amounts spent by customers at this store is \$27. What sample size should he choose so that the estimate is within \$3 of the population mean?

ANSWERS

1. 11.24 to 13.58 hours
2. 2.26 to 4.16 cavities
3. 27.51 to 29.09 students
4. \$2942.24 to \$3153.76
5. 4.93 to 5.63 kilograms
6. 4.16 to 5.50 nights
7. 24.29 to 26.31 years of age
8. 107
9. 84
10. 220