

Introduction to Probability, Statistics and Data Handling	Confidence intervals
Tutorial 7	

1. The population standard deviation for the age of Foothill College students is 15 years. If we want to be 95% confident that the sample mean age is within two years of the true population mean age of Foothill College students, how many randomly selected Foothill College students must be surveyed?
2. *Interval estimation in large and small samples. Normal distribution.*
 - a) A random sample of 120 students from a large university yields mean grade 2.7 with **population standard deviation $\sigma = 0.5$** . Construct a 90% , 95% and 98% confidence interval for the mean grade of all students at the university. Assume that the population from which the sample is taken has a normal distribution of grades.
 - b) Solve the above problem when the number of students is only 12
 - c) How many students we need to randomly surveyed to be 95% confident that sample mean grade is within 2 of the true population grade?
 - d) Solve b) but assume that you have **calculated the standard deviation s from the sample** and $s = 0.5$. You need to use **t-Student distribution**.
3. *Interval estimation in large samples. Unknown distribution.*

Suppose that an accounting firm does a study to determine the time needed to complete one person's tax forms. It randomly surveys 100 people. The sample mean is 23.6 hours. There is a known standard deviation of 7.0 hours.

 - a) Construct a 90% confidence interval for the population mean time to complete the tax forms.
 - b) If the firm wished to increase its level of confidence and keep the error bound the same by taking another survey, what changes should it make?
 - c) If the firm did another survey, kept the error bound the same, and only surveyed 49 people, what would happen to the level of confidence? Why?
 - d) Suppose that the firm decided that it needed to be at least 99% confident of the population mean length of time to within one hour. How would the number of people the firm surveys change? Why?
4. A random sample of statistics students were asked to estimate the total number of hours they spend looking at their mobiles during an average day. The responses are: 0, 3, 1, 20, 9, 5, 10, 1, 10, 4, 5, 14, 4, 5, 2. Use this sample data to construct a 98% confidence interval for the mean number of hours statistics students will spend on the mobiles.
5. Suppose scores on exams in statistics are normally distributed with an unknown population mean and a population standard deviation of three points. A random sample of 36 scores is taken and gives a sample mean (sample mean score) of 68. Find a 90% confidence interval for the true (population) mean of statistics exam scores.