

Introduction to probability statistics and Data handling	<b>Confidence Intervals</b>
Tutorial 7	

1. You want to rent an unfurnished one-bedroom apartment in Durham, NC next year. The mean monthly rent for a random sample of 60 apartments advertised on Craig's List (a website that lists apartments for rent) is \$1000. Assume a population standard deviation of \$200. Construct a 95% confidence interval.
  - a. How large a sample of one-bedroom apartments above would be needed to estimate the population mean within plus or minus \$50 with 90% confidence?
  
2. 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.
  
3. Duncan Jones kept careful records of the fuel efficiency of his car. After the first 100 times he filled up the tank, he found the mean was 23.4 miles per gallon (mpg) with a population standard deviation of 0.9 mpg. Compute the 95 percent confidence interval for his mpg.
  
4. Suppose that against a certain opponent the number of points the MIT basketball team scores is normally distributed with unknown mean and unknown standard deviation. Suppose that over the course of the last 10 games between the two teams MIT scored the following points: 59, 62, 59, 74, 70, 61, 62, 66, 62, 75. Compute a 95%  $t$ -confidence interval for mean.
  
5. The volume in a set of juice bottles is known to follow a  $N(\mu, 25)$  distribution. You take a sample of the bottles and measure their volumes. How many bottles do you have to sample to have a 95% confidence interval for mean with width 1?
  
6. In an article exploring blood serum levels of vitamins and lung cancer risks (The New England Journal of Medicine), the mean serum level of vitamin E in the control group was 11.9 mg/liter. There were 196 patients in the control group. (These patients were free of all cancer, except possible skin cancer, in the subsequent 8 years). Assume that the standard deviation  $\sigma = 4.30$  mg/liter. Find a 95% confidence interval for the mean serum level of vitamin E in all persons similar to the control group.
  - a. If you wanted to estimate the mean serum level of vitamin E, with 90% confidence, and a margin of error of no more than 0.25 mg/liter, how large a sample would you need?