1. A hardware manufacturer produces bolts used to assemble various machines. Assume that the diameter of bolts produced by this manufacturer has an unknown population mean $\boldsymbol{\mu}$ and the standard deviation is 0.1 mm . The average diameter of a simple random sample of 50 bolts is 5.11 mm . Calculate the $90 \%$ confidence interval.
2. If the sample of 50 bolts from problem \#1 had a mean diameter of 5.08, calculate the $95 \%$ confidence interval.
3. You want to rent an unfurnished one-bedroom apartment in Boston next year. The mean monthly rent for a simple random sample of 32 apartments advertised in the local newspaper is $\$ 1,400$. Assume that the standard deviation is known to be $\$ 220$. Find a $92 \%$ confidence interval for the mean monthly rent for unfurnished one-bedroom apartments available for rent in this community.
4. Suppose you were to change the confidence level in problem \#3 to $95 \%$ using the same sample. Describe how the confidence interval would change?
5. What does a $95 \%$ confidence interval mean?
6. A publisher wants to estimate the mean length of time (in minutes) all adults spend reading newspapers. To determine this estimate, the publisher takes a random sample of 15 people and obtains the following results: $11,9,8,10,10,9,7,11,11,7,6,9,10,8,10$

Assume that the population of times is normally distributed.
a. Find the point estimate of the population mean (i.e. the sample mean).
b. Construct the $95 \%$ confidence interval for the mean population length reading time.
c. What is the margin of error?
d. How can we reduce the margin of error?
7. Based on a sample of 100 employees a $95 \%$ confidence interval is calculated for the mean age of all employees at a large firm. The interval is (34.5 years, 47.2 years).
a. What was the sample mean?
b. Find the margin of error.

