Activity 1. In our class survey, a question was "About how many music CDs do you own?" The mean response was 70 and the standard deviation also was 70. Use these values as the mean ad standard deviation of a normal curve model for CDs owned. Obviously, it’s impossible to own fewer than 0 CDs, but with the normal curve model there is a probability of owning fewer than 0 CDs. Calculate that probability. Note: There’s a link for the normal curve table at the course web site under Class Handouts (www.stat.psu.edu/~rho/stat200/)

For 0 CDs  \( Z = \frac{X - \mu}{\sigma} = \frac{0 - 70}{70} = -1 \).

From the table, we learn that the area to the left of \( z = -1 \) is 0.158.

So, we get the rather strange result that about 16% own fewer than 0 CDs.

Why do you think the normal curve works so poorly here?

The actual data for CDs are skewed. A normal curve won’t work well for skewed data.

Activity 2. Explain whether the width of a confidence interval would increase, decrease, or remain the same as a result of each of the following changes:

- Decrease the sample size from 1,000 to 250.  Interval width increases.
- Increase the sample size from 1,000 to 2,000.  Interval width decreases.
- Increase the confidence level from 95% to 99%  Interval width increases.
- Decrease the confidence level from 95% to 90%.  Interval width decreases.

Activity 3.

a. In our class survey, 46 of 137 women have reported having 5 or more ear pierces. Calculate a 95% confidence interval for the proportion of all PSU women who have 5 or more ear pierces. You can use Minitab. (Stat>Basic Stats>1 Proportion, Use the Options button, click on Use Test and Interval based on Normal Distribution)

\[
X \quad N \quad \text{Sample p} \quad 95.0 \% \text{ CI} \\
46 \quad 137 \quad 0.335766 \quad (0.256686, 0.414846) \Rightarrow 0.336 \pm 2 \times \sqrt{\frac{0.336(1-0.336)}{137}}
\]
Activity 3 Continued.

b. In the survey, 16 of 68 men reported having at least one ear pierce. Calculate a 95% confidence interval for the proportion of all PSU men who have at least one ear pierce.

\[ \hat{p} = \frac{16}{68} = 0.235 \] . The Minitab result is:

<table>
<thead>
<tr>
<th>X</th>
<th>N</th>
<th>Sample p</th>
<th>95.0 % CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>68</td>
<td>0.235294</td>
<td>(0.134474, 0.336114)</td>
</tr>
</tbody>
</table>

c. What are the "margins of error" for parts a and b?

A “trick” is that the margin of error is the difference between the upper end of the interval and the sample p. 
For the women, this is about 0.08. 
For the men, this is about 0.10.

d. Repeat parts a and b using 90% confidence intervals. Are the intervals wider or narrower than those in parts a and b?

The intervals are narrower. A lower confidence level produces a narrower interval.