Ethics in Statistics
- Misrepresentation of statistical information
  - manipulating data
- Informed consent of subjects
  - Belmont Report
  - Institutional Review Board (IRB)

Chapter 2 Descriptive Statistical Analysis
Graphical tools
- stemplot (stem and leaf diagram)
- histogram (most commonly used)
- boxplot
Numerical tools
- center: mean, median, mode
- spread: standard deviation/variance, range, IQR
- position: percentiles, z-score
Creating a Stemplot

1. Divide data values between 2 digits into a "stem" and "leaf"

   example: College algebra data

   stem 1 3 7 4

   leaf 5

2. List stems vertically
3. Place each leaf next to its corresponding stem
4. Put leaves in order

```plaintext
   5 | 4 8
   6 | 4
   7 | 4 6 7
   8 | 7 8
   9 | 2 9 8 3 8 8 8
  10 | 2 9 5 1 1 1 4
  11 | 3 9 4

   5 | 4 8
   6 | 4
   7 | 4 6 7
   8 | 7 8
   9 | 2 3 8 8 8 8 9
  10 | 1 1 1 2 4 5 9
  11 | 3 4 9
```
Features of a data distribution

1. Center
in the 90's

2. Spread
scores range from 54 to 119

3. Shape
skewed left

4. Outliers
none

College algebra data stemplot

Standard shapes:
- bell shaped
- symmetric
- uniform
- skewed (a tail off to one side)
- left or right to side of tail
- bimodal (2 concentrations of data values)

Outliers are unusual data values separated from the rest of the distribution.
Histogram - bar graph of a data distribution

To create:
1. Divide your data range into equal categories
2. Count the number of data values in each category
3. Mark off categories on a horizontal axis
4. Draw a bar over each category corresponding to the number of values in the category

Example: college algebra E2 data
1. categories 10 wide

```
50 - 59
60 - 69
70 - 79
80 - 89
90 - 99
100 - 109
110 - 119
```

```
<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 59</td>
<td></td>
</tr>
<tr>
<td>60 - 69</td>
<td></td>
</tr>
<tr>
<td>70 - 79</td>
<td>4</td>
</tr>
<tr>
<td>80 - 89</td>
<td>1</td>
</tr>
<tr>
<td>90 - 99</td>
<td>5</td>
</tr>
<tr>
<td>100 - 109</td>
<td>7</td>
</tr>
<tr>
<td>110 - 119</td>
<td>6</td>
</tr>
</tbody>
</table>
```

```
70  80  90  100  110  120
```

Calculator (or any statistical technology) can draw histograms (better than this one!)