An ogive (pronounced o-jive) tells us the percentile rank of an observation in a distribution. They’re lots of fun to look at and have a cool name! Here’s how to make an ogive for the ages of the Presidents at the time of their inauguration. We’ll use a class size of 5 years. Start by filling in the rest of the table below.

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
<th>Relative frequency</th>
<th>Cumulative frequency</th>
<th>Cumulative relative frequency (percentile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-44</td>
<td>2</td>
<td>2/45 = 4.4%</td>
<td>2</td>
<td>2/45 = 4.4%</td>
</tr>
<tr>
<td>45-49</td>
<td>7</td>
<td>7/45 = 15.6%</td>
<td>9</td>
<td>9/45 = 20%</td>
</tr>
<tr>
<td>50-54</td>
<td>13</td>
<td>13/45 = 28.9%</td>
<td>22</td>
<td>22/45 = 48.9%</td>
</tr>
<tr>
<td>55-59</td>
<td>12</td>
<td>12/45 = 26.7%</td>
<td>34</td>
<td>34/45 = 75.6%</td>
</tr>
<tr>
<td>60-64</td>
<td>7</td>
<td>7/45 = 15.6%</td>
<td>41</td>
<td>41/45 = 91.1%</td>
</tr>
<tr>
<td>65-69</td>
<td>3</td>
<td>3/45 = 6.7%</td>
<td>44</td>
<td>44/45 = 97.8%</td>
</tr>
<tr>
<td>70-74</td>
<td>1</td>
<td>1/45 = 2.2%</td>
<td>45</td>
<td>45/45 = 100%</td>
</tr>
</tbody>
</table>

Now here’s how to make the ogive. Put “Age” on the x-axis and go from 40 up to 75 by 5’s. Put “Cumulative Relative Frequency” on the y-axis and go from 0% to 100% by 10%. Now put a dot at age 40 and 0% because age 40 is the 0th percentile (there were no Presidents at or below age 40). Next put a dot at age 45 and 4.4% because 4.4% of the Presidents were younger than 45. Continue making dots for the other cumulative relative frequencies. Your last dot should be at age 75 and 100% (100% of the Presidents were younger than 75 at the time of their inauguration). Then connect the dots. Congratulations—you’ve made an ogive!
Now answer questions 1-4 based on your magnificent ogive.

1. Was Barack Obama, who was first inaugurated at age 47, unusually young? Explain.
   
   Yes, only about 10% of the Presidents were younger than him when he first took office.

2. Estimate and interpret the 65th percentile of the distribution.

   \[ \approx 58 \text{ years old} \]
   
   About 65% of all Presidents were younger than 58 years old when they took office.

3. Using only the ogive, describe how you could estimate the percent of Presidents who were between 55 and 60 years old at the time of their inauguration.

   Find the difference in cumulative relative frequencies for 55 and 60 years old.

   \[ 75-49 = 26\% \]

4. Describe the distribution of President ages at the time of their inauguration, using only the ogive.

   Shape - The distribution is fairly symmetric, slightly skewed right
   
   Outliers - There are no apparent outliers
   
   Center - The median is about 55 years old (50th percentile)
   
   Spread - The range is about 35 years old (75-40 = 35)

   No longer using the President data...

5. Multiple choice. Mark receives a score report detailing his performance on a statewide test. On the math section, Mark earned a raw score of 39, which placed him at the 68th percentile. This means that:

   (a) Mark did better than about 39% of the students who took the test.
   
   (b) Mark did worse than about 39% of the students who took the test.
   
   (c) Mark did better than about 68% of the students who took the test.
   
   (d) Mark did worse than about 68% of the students who took the test.
   
   (e) Mark got fewer than half of the questions correct on this test.

6. Mrs. Munson is concerned about how her daughter’s height and weight compare with those of other girls of the same age. She uses an online calculator to determine that her daughter is at the 87th percentile for weight and the 67th percentile for height. Explain to Mrs. Munson what this means.

   Her daughter is heavier than 87% of girls her same age and taller than 67% of girls her same age.