1. Use MATLAB to graph \( y = \frac{\sin(2\pi x)}{1 + x^2} \), \( y = \frac{1}{1 + x^2} \), and \( y = -\frac{1}{1 + x^2} \) on the same set of axes for \(-1 \leq x \leq 1\).

Please use the following formatting instructions.

- Draw the graph of \( y = \frac{\sin(2\pi x)}{1 + x^2} \) using a solid blue line, draw the graph of \( \frac{1}{1 + x^2} \) using a dashed red line, and draw the graph of \( y = -\frac{1}{1 + x^2} \) using a dashed green line.
- Create a legend to indicate which curve is which. **The only variables in the problem are** \( x \) **and** \( y \). **Don’t use other letters in your legend.**
- Be sure to label your axes. **The only variables in the problem are** \( x \) **and** \( y \). **Don’t use other letters in your axis labels.**
- Use enough points so your graphs look like smooth curves.

2. (Similar to Gilat chapter 5 # 10).

A *cycloid* is specified by the parametric equations \( x = r(t - \sin(t)) \), \( y = r(1 - \cos(t)) \).

Draw a cycloid with \( r = 1.5 \) and \( 0 \leq t \leq 8\pi \). Use the `axis` command to make the x axis run from 0 to 40 and the y axis run from 0 to 10.

3. Generate a figure with a \( 1 \times 2 \) array of windows. In one window draw a loglog plot of the function \( C(\omega) = \frac{1}{\sqrt{1 + \omega^2}} \) for \( 10^{-2} \leq \omega \leq 10^3 \), and in the other window draw a plot of \( C(\omega) \) with the horizontal axis scaled logarithmically and the vertical axis scaled linearly. Be sure to label the axes. (The string ‘\omega’ will produce the Greek lower case letter \( \omega \).)

4. Draw a polar plot of \( r = 1 + \sin(\theta) \) for \( 0 \leq \theta \leq 2\pi \).

5. Use the Import Wizard to import the data in column D of [Dr. Colby’s data file](source). (This column contains the maximum recorded temperature at UMass Lowell for the dates 1/1/2014 - 6/30/2014.) Draw a histogram of these values using 11 bins.