Assignment 5
Due April 22, 2016

Submissions are due by 11:59PM on the specified due date. Submissions may be made on the Blackboard course site under the Assignments tab. Late submissions will NOT be accepted for this assignment.

Make sure your name and FSUID are in a comment at the top of the file.

1. sine_plotter.py (100 points)

Your task is to write a GUI application that will allow a user to plot a sine function with the following general form:

\[ y(x) = A \times \sin(2\pi fx + \varphi) \]

where

- \( A \) is the amplitude.
- \( f \) is the frequency.
- \( \varphi \) is the phase.

The user should be able to specify the value of each of these variables and then be able to plot the corresponding sine function over the interval \( x = 0 \) to \( x = 2 \). By default, the y-axis should range from \( y = -1.5 \) to \( y = 1.5 \).

In addition to being able to plot the sine function, the user should be able to plot multiple sine functions on the same figure by simply changing the variable values and clicking the plot button. Each individual plotted function should be represented by a separate color, with up to six colors supported. The user should be able to clear the figure of all plots by clicking the clear button. You should also include the matplotlib-provided NavigationToolbar widget so that the user can manipulate the figure. Some modules that you may want to use for this task include:

- PyQt4
- matplotlib
- numpy
- matplotlib.backends.backends_qt4agg
Figure 1: Starting state of application shows sine function for $A = 1, f = 1,$ and $\phi = 0$.

Figure 2: After plotting two additional functions with $A = .8, f = 1.5,$ and $\phi = 1$ and $A = 1.3, f = .5,$ and $\phi = 2.6$. 
Figure 3: After clearing the figure.

Figure 4: After plotting 6 sine waves with $A = 1, f = 1,$ and $\phi = 0$ through $\phi = 5$. 