Computational Physics / PHYS-UA 210 / Problem Set #6
Due October 11, 2019

You *must* label all axes of all plots, including giving the *units*!!

1. Exercise 5.15 in Newman.

2. This problem will explore interpolation a little so you have some experience with it. We will interpolate values of the sin() function. In each part below, you will interpolate sin() from a grid of known values at N equally spaced points for x between 0 and 10π (inclusive).

   (a) First, use linear interpolation, writing this code yourself. Test your code for $N = 20$, $N = 40$, $N = 80$, and $N = 160$. Quantify the rms residuals of the interpolation relative to sin() within the range of the grid, as a function of N.

   (b) Second, go ahead and utilize the `interp1d` class in `scipy.interpolate` to interpolate. Test the `slinear`, `quadratic`, and `cubic` methods in the same way as above.

   (c) Third, add a little bit of noise to the values of sin() that you interpolate between; use Gaussian noise with a standard deviation of 0.1. Show some examples of how the interpolation behaves.