Math 455: Group project 1 (due August 29, 2014)

1. Discuss pros and cons of the Lagrange method and Newton method for polynomial interpolation. Give an example of the situation in which one method works better than another.

2. Give one specific example of the application of polynomial interpolation.

3. Find another way to interpolate $f(x)$ on the set of distinct points x_i, $i = 0, \ldots, n$. The interpolating function does not have to be a polynomial. Any necessary assumption on f can be made.

4. Use Lagrange approach to formulate a simple Hermite interpolation. (i.e. find $p(x)$ that interpolates f and f' on the set of distinct points x_i, $i = 0, \ldots, n$.)

5. Use Newton approach to formulate a general Hermite interpolation. (i.e. find $p(x)$ that interpolates f and the derivatives of f, up to any existing order, on the set of distinct points x_i, $i = 0, \ldots, n$.)

6. To a construct a well-defined cubic spline interpolating f on the set of distinct points x_i, $i = 0, \ldots, n$, how many more conditions does one need to impose? Find at least two ways to do so. Any necessary assumption on the regularity of f can be made.