Math 455: Homework 1 (due August 22, 2014)

1. Determine the interpolating polynomial of degree 2, $p_2(x)$, in both Lagrange and Newton forms for the functions

$$f(x) = \frac{2}{1+x^2}, \quad g(x) = \cos(\pi x),$$

   using the interpolation points $x_0 = -1, x_1 = 0, x_2 = 1$. For each function, check if both forms (Lagrange and Newton) are the same.

2. Repeat the above problem using polynomials of degree 3, $p_3(x)$, and the additional interpolation point $x_3 = \frac{1}{2}$.

3. Plot $g(x)$ and its corresponding interpolating polynomial, $p_3(x)$, using MATLAB. Label the graphs and all the interpolation points.

4. Prove (3.1.4) in Atkinson, page 132.

5. Atkinson: page 186, problem 2.

6. Atkinson: page 186, problem 3.