Math 3620, Machine Problem 8: Due 3/17

1) Write a function `c = newtinterp(x,y)` based on divided differences to calculate the coefficients $c_1, \ldots, c_{n+1}$ of the polynomial of degree n in Newton form that interpolates the values $y_1, \ldots, y_{n+1}$ at the points $x_1, \ldots, x_{n+1}$. The input should be n and the x and y vectors. The output should be the c vector.

2) Write a function `v = hornernewton(c,x,t)` to evaluate the above Newton polynomial at a **column vector** `t` of points. The output should be a column vector of the same size.

3) Let $f(x) = 1/(1 + x^2)$ on the interval $I := [-5, 5]$. Write a driver program which

   a) prompts the user for n and finds the coefficients of the corresponding interpolating polynomial p based on $n + 1$ equally spaced points in I.

   b) defines a column vector t of 201 equally spaced points in I and computes the values of f and p at these points.

   c) uses these values to draw a graph of p and f on the same figure. Mark the points $\{(x_i, y_i)\}_1^{n+1}$ with a small circle.

   d) uses the computed values to find and print the maximum absolute difference between f and p on these 201 sample points.

4) Run this driver for $n = 5, 9, 17$ and turn in the resulting three figures annotated with the associated max errors.

5) Write a second driver which replaces equally spaced points in I by scaled Chebychev points.

6) Run this driver for $n = 11, 21, 41$. It is enough to turn in only one figure (for $n = 41$), but include a table of the errors for the three cases.