AMSC/CMSC 460 Quiz 2 , Fall 2002

1. (7) Recall that the polynomial

$$a_1 x^n + a_2 x^{n-1} + \ldots + a_n$$

can be evaluated by Horner's rule (nested multiplication) like this:

$p = a_1$
For $j = 2, \ldots, n$,

$$p = p * x + a_j.$$

end for

Write a program that uses nested multiplication to evaluate

$$c_1 + c_2(x - z_1) + c_3(x - z_1)(x - z_2) + \ldots + c_n(x - z_1)(x - z_2)\ldots(x - z_{n-1}),$$

where the coefficients c_i and the numbers z_i are given in arrays `c` and `z`.

Answer:

$p = c_n$
For $j = n - 1 : -1 : 1$,

$$p = p * (x - z_j) + c_j.$$

end for

2. (7) Given that $(x, f(x))$ = (0,-3), (2,6), (-1,-5), compute $f[0, 2, -1]$.

Answer: Divided difference table:

$f[x]$	f[x,y]	f[x,y,z]
-3		
6	9/2	
-5	11/3	9/2-11/3

So $f[1, 2, 3] = 9/2 - 11/3 = 5/6$.

3. (6) Write down the Lagrange form of the interpolating polynomial for the data $(x, f(x))$ = (1,-5), (3,-3).

Answer:

$$p(x) = -5\frac{x-3}{1-3} + (-3)\frac{x-1}{3-1}.$$