Home work 6: Due Thurs. March. 10, 2016 Math 2335 Spring 2016

Name: ____

(1) Consider the data in the table

x_n	1.1	1.2	1.3
$f(x_n)$	0.1	0.22	0.40

(a) Compute the divided differences $f[x_0, x_1]$ and $f[x_0, x_1, x_2]$.

(b) Find the linear and quadratic interpolating polynomials using the Newton Divided Difference formulation.

(c) Suppose we know that the data comes from a function $f(x)$ that is twice differentiable and that $|f''(c)| \le M$ for all c in the interval $[1.1, 1.3]$. Show that the error

$$|f(x) - P_1(x)| \le \frac{0.01M}{8}, \quad \text{for} \quad 1.1 \le x \le 1.2.$$

(2) Let $f(x) = x^2$ for $0 \le x \le 1$. Compute the second order divided difference $f[x_0, x_1, x_2]$ for each set of nodes. Which theorem does this demonstrate?

(a) $x_0 = 0, \quad x_1 = \frac{1}{2}, \quad x_2 = 1$

(b) $x_0 = 0, \quad x_1 = \frac{1}{3}, \quad x_2 = 1$

(c) $x_0 = a, \quad x_1 = b, \quad x_2 = c$ for any different numbers a, b and c.