Quiz 03

Nov 12, 2010.

1. (paper and pencil) Find the Newton's divided differences from the data $(x_i, y_i) = (0, 1)$, $(1, 1)$, $(1.5, 2)$, $(2, 3)$. Then find the corresponding interpolating polynomial.

2. (programming) Write a subroutine or function that computes the divided differences $f[x_0, \cdots, x_k]$, $k = 0, \cdots, n$ from given data $(x_0, y_0), \cdots, (x_n, y_n)$.

   Name your code as your_id_number.m (such as u9623456.m) and leave it on the desktop. DO NOT SHUT DOWN THE COMPUTER. Make sure your code is executable. For example, test it with the data given in previous problem.

3. Find a polynomial $P(x)$ such that $P(5) = 1$, $P(0) = P(2) = P(3) = 0$. Need not expand nor simplify.

4. Let x_0, x_1, x_2, and x_3 be distinct. Find all functions f such that $L_{3,0}(x) + L_{3,1}(x) + L_{3,2}(x) + L_{3,3}(x) = f(x)$ for all $x \in \mathbb{R}$. Explain.

5. Give an upper bound for the interpolating error $\max_{x\in[0,1]} |f(x) - P(x)|$, with $x_0 = 0$, $x_1 = 1/3$, $x_2 = 2/3$, $x_3 = 1$, and $f(x) = e^x$. Explain. The upper bound does not have to be optimal, but you need to show your derivation.

Numerical Analysis I, Fall 2010 (http://www.math.nthu.edu.tw/~wangwc/)

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