MACM 316 Assignment 5
Date: November 9, 2006
Date due: 5pm, Tuesday, November 21, 2006

Please submit your answers, stapled together with your name and student id cover-page, in the assignment box marked MACM 316.

1. Practice problems from the text:
   (a) Section 3.1: 4(b)(d), 6(a)(c) for Lagrange polynomial of degree two only, 14
   (b) Section 3.4: 14
   (c) Section 4.1: 2, 4, 22
   (d) Section 4.2: 6, 8
2. Problems to hand in.
   (a) Section 3.1: 2(b)(d), 22
   (b) Section 3.4: 16
   (c) Section 4.1: 14
   (d) Section 4.2: 10
   (e) Determine the error term for the formula $f'(x) \approx \frac{1}{4h}[f(x+3h) - f(x-h)]$.
   (f) Using Taylor series, establish the error term for the formula $f'(0) \approx \frac{1}{2h}[f(2h) - f(0)]$.
   (g) Criticize the following analysis. By Taylor's formula, we have

$$f(x+h) - f(x) = hf'(x) + \frac{h^2}{2}f''(x) + \frac{h^3}{6}f'''(\xi)$$

$$f(x-h) - f(x) = -hf'(x) + \frac{h^2}{2}f''(x) - \frac{h^3}{6}f'''(\xi)$$

   So by adding, we obtain an exact expression for $f''(x)$.