

MACM 316 Assignment 4

Date: October 20, 2006

Date due: 5pm, Friday, November 3, 2006

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

1. Problems from the text:
 - (a) Section 2.1: 14, 16, 18
 - (b) Section 2.2: 4(b), (c), (d)
 - (c) Section 2.3: 20(a) and (b) (Write a program to answer the question. Take $x_{tol} = f_{tol} = 1.e - 5$ and $N_0 = 10$. Remember that both the roots need to be approximated.)
 - (d) Section 2.4: 6, 8, 12
2. In class we showed that if Newton's iteration converges to p , a root of $f(x) = 0$, usually it has quadratic convergence. It is true that after $f(x_n)$ is small enough, $f(x_{n+1})$ is squared. Suppose f , f' and f'' are continuous. Prove that if x_n converges to a root, then $f(x_n)$ converges to 0 with quadratic convergence. In other words, $\lim_{n \rightarrow \infty} \frac{|f(x_{n+1})|}{|f(x_n)|^2} = c$ for some nonzero constant c . (Use Taylor series.)