Numerical Analysis PhD Qualifying Exam
University of Vermont, Winter 2011

Instructions: _Four_ problems must be completed, and in addition to those, _one_ more problem must be attempted. At least two problems from 1-4 and at least two problems from 4-7 must be completed. **Note** that Question 4 can count towards either section, but not both. To have attempted a problem, you must correctly outline the main idea of the solution and begin the calculation, but need not have finished. You have _three hours_ to complete the exam.

1. (a) Given an initial guess x_0, derive Newton's method to find a better guess x_1 for approximating the root of a function $f(x)$. (b) Apply Newton's method to the function $f(x) = 1/x$ using an initial guess of $x_0 = 1$