AMSC/CMSC 660 Quiz 9 , Fall 2003

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, communication with others, scratchpaper, etc.

Name _____

Student number _____

1. (10) You are asked to minimize a function of $n = 2000$ variables. Consider doing this by Newton's method, a quasi-Newton method, or Pattern search. Give the main advantages and disadvantages of each. Which would you choose? Why?

2. (10) In Broyden's method for solving nonlinear equations, we need to solve a linear system involving the $n \times n$ matrix

$$B^{(k+1)} = B^{(k)} + \frac{(y - B^{(k)}s)s^T}{s^T s}\,.$$

Recall the Sherman-Morrison-Woodbury formula

$$(A - ZV^T)^{-1} = A^{-1} + A^{-1}Z(I - V^T A^{-1} Z)^{-1} V^T A^{-1}\,.$$

If we have a way to solve linear systems involving $B^{(k)}$ using p multiplications, how long would it take to solve a linear system involving $B^{(k+1)}$?