AMSC/CMSC 660 Quiz 5 , Fall 2004

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, other electronic devices, communication with others, scratchpaper, etc.

Name _____

1. (10) Suppose we have factored $A = LU$ and now we need to solve a linear system $(A - ZV^T)x = b$, where Z and V have dimension $n \times k$ and k is much less than n. Write Matlab code to do this correctly (5 points) and efficiently (5 points). You might want to use the Sherman-Morrison-Woodbury Formula:

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

2. (10) Let $f(x) = e^{x_1+x_2}x_1 + x_2^2$ and consider the point $x_1 = 1$, $x_2 = 0.3863$. Compute the Newton direction and determine whether it is downhill.
Helpful Fact: $e^{1.3863} = 4.0000$.