AMSC/CMSC 660 Quiz 7 , Fall 2009

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) Write a sequence of MATLAB commands that explain how to use the SVD of a full-rank $n \times n$ matrix $\boldsymbol{A}$ to solve the linear system $\boldsymbol{Ax} = \boldsymbol{b}$. You can assume that we have already computed `[U,S,V] = svd(A)` so that $\boldsymbol{A} = \boldsymbol{USV}^T$.

2. (10) Consider the square centered at $[0,0]^T$ with a vertex at $[1,1]^T$. Let $\boldsymbol{x} = [x_1, 1]^T$ be a point on the edge of the square, and let $\boldsymbol{y}$ be a 2×1 vector with $y_1 < 0$ and $y_2 > 0$. We want to find $t > 0$ so that

$$\boldsymbol{w} = \boldsymbol{x} + t\boldsymbol{y}$$

is on an edge of the square.

Write MATLAB code to do this reliably, given the limits of floating-point arithmetic.