MATH 5610/6860
HOMEWORK #6, DUE THU NOV 12

Note: Math 5610 Students: 5 problems for full-credit. Math 6860 Students: 6 problems for full-credit.

1. K&C 4.1.20 Give an example of a matrix with all positive entries such that $x^T Ax$ is sometimes negative.
2. K&C 4.2.31 Find the Cholesky factorization of
$$\begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$$
3. K&C 4.4.40 Compute the condition numbers using norms $\|A\|_\infty$ and $\|A\|_2$ of the matrices:
$$\begin{bmatrix} \alpha & 1 \\ 1 & 1 \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} 0 & 1 \\ -2 & 0 \end{bmatrix}$$
4. K&C 4.4.48 Prove that the condition number has the property
$$\kappa(\lambda A) = \kappa(A) \quad (\lambda \neq 0)$$
5. K&C 4.5.2 Prove that if A is invertible and $\|B - A\| < \|A^{-1}\|^{-1}$, then B is invertible.
6. K&C 4.5.10 Prove that if $\|A\| < 1$, then
$$(I + A)^{-1} = I - A + A^2 - A^3 + \cdots$$
7. B&F 6.2.2b and 6.2.4b