Quiz #4 (CSE 4190.313)

Wednesday, June 10, 2015

Name: _____ **ID No:** _____

1. (10 points)

   (a) If A has independent columns, its left-inverse $(A^TA)^{-1}A^T$ is A^+.

   (b) If A has independent rows, its right-inverse $A^T(AA^T)^{-1}$ is A^+.

   In both cases, verify that $\mathbf{x}^+ = A^+\mathbf{b}$ is in the row space, and $A^TA\mathbf{x}^+ = A^T\mathbf{b}$.

2. (15 points) True or false, with a good reason.

   (a) (4 points) A^2 and B^2 can be similar even if A and B are not similar.

   (b) (4 points) $\begin{bmatrix} 3 & 0 \\ 0 & 4 \end{bmatrix}$ is similar to $\begin{bmatrix} 3 & 1 \\ 0 & 4 \end{bmatrix}$

   (c) (4 points) $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ is similar to $\begin{bmatrix} 3 & 1 \\ 0 & 3 \end{bmatrix}$

   (d) (3 points) If we exchange rows 1 and 2 of A, and then exchange columns 1 and 2, the eigenvalues stay the same.

3. (15 points) Find the tridiagonal HAH^{-1} that is similar to

$$A = \begin{bmatrix} 1 & 4 & 3 \\ 4 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix}.$$