Name_____ID_____No_____

2110201 Quiz4

Basic Skill

1. (6 points) Find the orthonormal basis by applying Gram-Schmidt algorithm to the given vectors in the given order, i.e., the direction of v_1 should stay the same.
    a. $v_1 = (1,2), v_2 = (3,4)$
    b. $v_1 = (1,0,0), v_2 = (1,1,1), v_3 = (1,1,0)$

Name_____ID_____No_____

2. (6 points) Find all eigenvalues and eigenvectors of the following matrices
   a. $\begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$
   b. $\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & 5 \end{bmatrix}$.

Name_____ID_____No_____

3. (8 points) An SVD of matrix A is given by $\begin{bmatrix} 0.5 & -0.5 & 0.5 & 0.5 \\ -0.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & -0.5 \\ 0.5 & 0.5 & -0.5 & 0.5 \end{bmatrix} \begin{bmatrix} 3 & 0 \\ 0 & 2 \\ 0 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}^T$

Matrix A has _____ rows and _____ columns.

Rank of A = _____ Nullity of A = ____

From the SVD, write down a basis of each of the following spaces

$row(A)$

$col(A)$

$nul(A)$

$nul(A^T)$