Name:

Practice Final Exam

1. True/false
    1) Cramer's rule can be used on Ax=b when det(A)=0.
    2) It's possible for a basis of R^n to contain the zero vector.
    3) Vectors in an orthogonal set are always linearly independent.
    4) The row echelon form of a square matrix is unique.
    5) For a n x n matrix A, if A is invertible, then A is diagonalizable.

2. Example
    1) Provide an example of two parallel victors in an R^2 space.
    2) Give an example of an invertible matrix A such that $A = A^{-1}$.
    3) Give one of the standard basis of IR^3.
    4) Give an example of a transformation T: $R^2 \rightarrow R^2$ that is not linear.
    5) Give an example of a 2 x 2 matrix that don't have real eigenvalues.

3. Let A = $\begin{bmatrix} 2 & -5 & 5 \\ 0 & 4 & 3 \end{bmatrix}$, B = $\begin{bmatrix} 8 & -6 \\ -4 & -1 \\ 2 & 3 \end{bmatrix}$, then:
    1) AB = _
    2) BA = _
    3) det(AB) = _
    4) det(BA) = _

4. Use the Cramer's Rule to find values for x, y, and z that satisfy the following systems

$$-5x + 6y + 4z = 0$$
$$-7x - 8y + 2z = -20$$
$$2x + 9y - z = 12$$

5. Find the basis of the subspace R^4 that consists of all vectors perpendicular to both $\begin{bmatrix} 1 \\ 0 \\ 1 \\ -9 \end{bmatrix}$ and $\begin{bmatrix} 0 \\ 1 \\ -8 \\ -1 \end{bmatrix}$.

6. The matrix A = $\begin{bmatrix} -11 & 3 \\ -6 & -2 \end{bmatrix}$ has eigenvalues -5 and -8. Find its eigenvectors.

7. Given that the matrix A has eigenvalues $\lambda_1 = 4$ with corresponding eigenvector $\overrightarrow{v_1} = \begin{bmatrix} -1 \\ -2 \end{bmatrix}$ and $\lambda_2 = -4$ with corresponding eigenvector $\overrightarrow{v_2} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$, find A.