ÇANKAYA UNIVERSITY
DEPARTMENT OF MATHEMATICS
November.4, 2004

Math 257
Mathematics for Electronic Engineers
Midterm 1

Duration::90 min.
Problems
1. Find all solutions of the given system of linear equations

$$x + y - z + t = 2$$
$$2x - y + 2z - t = -1$$
$$-x - 4y + 5z - 4t = 0$$
$$x - y + 4z - t = 1$$

2. Find the rank of the matrix

$$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 5 & 8 \\ -3 & 4 & 4 \\ 1 & 2 & 4 \end{bmatrix}.$$

3. Find the value of x satisfying the equation

$$\begin{vmatrix} 1 & 0 & 3 & 7 \\ 4 & 2 & 0 & 1 \\ 7 & x & 3 & 0 \\ 5 & 0 & x & 8 \end{vmatrix} = 0.$$

4.Is the matrix

$$A = \begin{bmatrix} 0 & -2 & 4 \\ 1 & 0 & -1 \\ 0 & 4 & -7 \end{bmatrix}$$

invertible? If so, find A^{-1}.

5. Find a basis of eigenvectors and diagonalize. (Show the details)

$$A = \begin{bmatrix} 2 & 0 & 0 \\ -1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}.$$

6.For which values of k are the following vectors linearly dependent?

$$u = \begin{bmatrix} 2 \\ k \\ -1 \end{bmatrix}, v = \begin{bmatrix} 1 \\ -2 \\ k+1 \end{bmatrix}, w = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}.$$