Math 3333, Test I

September 26, 2007

Show all your work to receive full credit. The use of books and notes is not allowed. Good luck!

I. (20 pts) For matrices $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ -1 & 2 \end{bmatrix}$ compute

a) AB

b) $2A^T$

c) $3A - B^T$

II. (20 pts) Solve the linear system, with the given augmented matrix

$$\left[\begin{array}{cccc|c} 1 & 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 1 & 2 & 1 & 0 & 0 \end{array}\right].$$

III. (20 pts) Find the inverse of a matrix

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

IV. (20 pts) Prove that the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 6 \end{bmatrix}$ is non-singular and write it as a product of elementary matrices.

V. (20 pts) Let $A = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 2 & 0 & 0 & -1 \\ 3 & 3 & 0 & 1 \\ 6 & 2 & -4 & 0 \end{bmatrix}$.

a) Find the co-factors A_{12} and A_{13}.

b) Compute $\det A$.

c) How many solutions does the homogeneous system $Ax = 0$ have?

d) What is the determinant of the matrix B obtained from A by interchanging 1st and 2nd rows of A?