Math 320, Linear Algebra I, Quiz 2, January 30, 2013, Instructor: S. Friedland

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Show all work. **Unjustified** answer yields no credit.

1. (6 pts) Find two distinct row echelon forms (REF) of the matrix

$$\begin{bmatrix} 2 & 2 & 2 & 4 \\ 4 & 4 & 5 & 6 \end{bmatrix}$$

2. a. (2pts) Define the notion: a matrix A is nonsingular.

b. (2pts) Suppose that A is 3×3 nonsingular matrix. Write down its reduced row echelon form (RREF).

1. $$\begin{bmatrix} 2 & 2 & 2 & 4 \\ 4 & 4 & 5 & 6 \end{bmatrix} \xrightarrow[R_2-4R_1\to]{\frac{1}{2}R_1\to R_1} \begin{bmatrix} 1 & 1 & 1 & 2 \\ 4 & 4 & 5 & 6 \end{bmatrix} \to \begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

First REF (3p)

Now Bring to RREF

$$\begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & 0 & 1 & -2 \end{bmatrix} \xrightarrow{R_1-R_2\to R_1} \begin{bmatrix} 1 & 1 & 0 & 4 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$ (3p)

RREF-Second REF

2a. A is $n\times n$ matrix (square matrix) such that the system $A\underline{x}=\underline{0}$ has a unique solution $\underline{x}=\underline{0}$ (the trivial solution) (2p)

b. A is nonsingular $\iff$ its RREF is I_n.

So for $n=3$ A must have the RREF:

(2p) $$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$