

Name: ANSWERSInstructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. Fill in the blanks:

Suppose the RREF of  $A$  is  $I_n$ , then

- The system  $A\vec{x} = \vec{b}$  has one (unique) solutions/
- The matrix  $A$  is non-singular (singular/non-singular)
- $\det A \neq$  0
- The solution to  $A\vec{x} = \vec{0}$  is  $\vec{x} =$   $\vec{0}$
- $A^{-1}$  exists (exists/does not exist)
- If  $A\vec{x} = \vec{b}$ , then  $\vec{x} =$   $A^{-1}\vec{b}$
- $A$  is (is/is not) the product of elementary matrices

2. Suppose  $A$  and  $B$  are invertible, then  $(AB)^{-1} =$   $B^{-1}A^{-1}$ 3. Suppose  $A_{3 \times 3}$  is a matrix with  $|A| = -2$ . What is  $\det 3A^2A^T A^{-1} =$  108

Bonus:

1. What is the inverse of  $A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 3 & 1 & 4 \end{pmatrix}$ ?  $A^{-1} =$   $\frac{1}{2} \begin{pmatrix} 5 & 3 & -3 \\ -11 & -5 & 7 \\ -1 & -1 & 1 \end{pmatrix}$ 2. Let  $A$  be as in problem 3. Solve  $A\vec{x} = \vec{b}$ , where  $\vec{b} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$ . We have  $\vec{x} =$   $\begin{pmatrix} 4 \\ -9 \\ -1 \end{pmatrix}$