

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 only one (a unique) solutions
- The matrix A is non-singular (invertible) (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)

2. Suppose A and B are invertible, then $(AB)^{-1} =$ $B^{-1}A^{-1}$ 3. What is the inverse of $A = \begin{pmatrix} 1 & -2 & 3 \\ 2 & -1 & -1 \\ -3 & 1 & 4 \end{pmatrix}$? $A^{-1} =$ $\frac{1}{4} \begin{pmatrix} -3 & 11 & 5 \\ -5 & 13 & 7 \\ -1 & 5 & 3 \end{pmatrix} = \begin{pmatrix} -3/4 & 11/4 & 5/4 \\ -5/4 & 13/4 & 7/4 \\ -1/4 & 5/4 & 3/4 \end{pmatrix}$

Bonus:

- 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 $\vec{x} =$ $\begin{pmatrix} -2 \\ -3 \\ -1 \end{pmatrix}$ used $A^{-1} \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$
- Suppose $A_{2 \times 2}$ is a matrix with $|A| = -3$. What is $\det 3A^2 A^T A^{-1} =$ $81 = 3^2(-3)^2(-3)(-\frac{1}{3})$