

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

1. Fill in the blanks:

Suppose $\det A \neq 0$, then

- The system $A\vec{x} = \vec{b}$ has only one (a unique) solutions
- A^{-1} exists (exists/does not exist)
- The matrix A is non-singular (invertible) (singular/non-singular)
- The RREF of A is I_n
- The solution to $A\vec{x} = \vec{0}$ is $\vec{x} = \underline{\vec{0}}$

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

Bonus:

1. Let A be as in problem 3. Solve $A\vec{x} = \vec{b}$, where $\vec{b} = \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$. We have $\vec{x} = \begin{pmatrix} 7/2 \\ 9/2 \\ 3/2 \end{pmatrix}$ used $A^{-1} \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$ 2. Suppose $A_{2 \times 2}$ is a matrix with $|A| = -2$. What is $\det 2A^3 A^T A^{-1} = \underline{-32} = 2^2(-2)^3(-2)(-\frac{1}{2})$