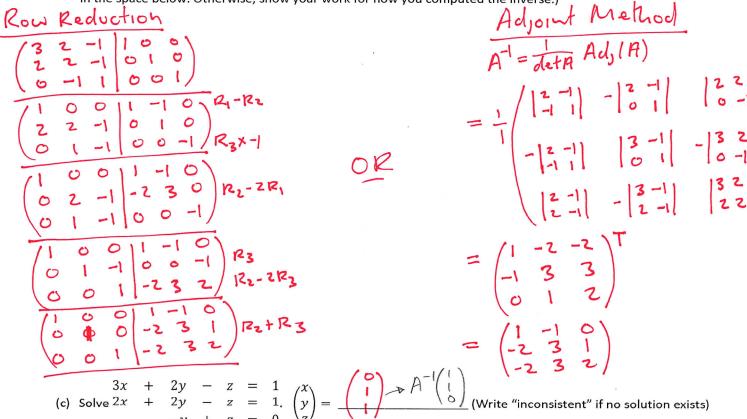
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Instructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

- 1. Let $A = \begin{pmatrix} 3 & 2 & -1 \\ 2 & 2 & -1 \\ 0 & -1 & 1 \end{pmatrix}$. $\begin{vmatrix} 3 & 2 & -1 \\ 2 & 2 & -1 \\ 0 & -1 & 1 \end{vmatrix} = \begin{vmatrix} 1 & 0 & 0 \\ 2 & 2 & -1 \\ 0 & -1 & 1 \end{vmatrix} = \begin{vmatrix} 2 & -1 \\ -1 & 1 \end{vmatrix}$
 - (a) Compute $\det A = \underbrace{\hspace{1cm}}$ (You may consider using pivotal condensation to help)
 - (b) Find $A^{-1} =$ _____ (Write "N/A" if A^{-1} does not exist, and state your reason in the space below. Otherwise, show your work for how you computed the inverse.)



2. Define, via an equation, what it means for the matrix A to be symmetric: $A = A^{\top}$

Bonus:

- **1.** Let V be a vector space over a scalar field \mathcal{F} . Let $\vec{u}, \vec{v} \in V$ and suppose $k, l \in \mathcal{F}$. Which of the following are not a property of V? Circle the appropriate one(s).
 - $\vec{u} \cdot \vec{v} = \vec{v} \cdot \vec{u}$
 - $\bullet \quad \vec{u} + \vec{v} = \vec{v} + \vec{u}$
 - $(k+l)\vec{u} = k\vec{u} + l\vec{u}$
 - Every \vec{u} has a negative.

- $1\vec{u} = \vec{u}$
- For each $\vec{u} \in V$, if $\vec{u} \neq \vec{0}$, then there exists a vector \vec{u}^{-1} such that $\vec{u} \cdot \vec{u}^{-1} = 1$. (Remember, 1 is the multiplicative identity.)
- 2. Let $U \subseteq V$, where V is a vector space over a field \mathcal{F} . What two conditions must U fulfill to be a subspace of V?
 - (i) Us closed under addition.
 - (ii) Us closed under scalar multiplication.