LINEAR EQUATIONS KEY

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What is the determinant of $\mathbf{A} = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$? $|\mathbf{A}| = \underline{(2)(3) - (1)(1) = 5}$

Does this system of equations have a unique solution? YES

What is the determinant of $\mathbf{A} = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$? $|\mathbf{A}| = \underline{(2)(1) - (2)(1) = 0}$

Does this system of equations have a unique solution? NO

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Find the determinant and inverse:

1. $\mathbf{A} = \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$ det(A) = 12 – 12 = 0, no inverse

2. $\mathbf{B} = \begin{bmatrix} 2 & 6 \\ 3 & 9 \end{bmatrix}$ det(B) = 18 – 18 = 0, no inverse

3. $\mathbf{C} = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ det(C) = 4 – 6 = -2

   $\text{inv(C)} = -\frac{1}{2}\begin{bmatrix} 1 & -3 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} -1/2 & 3/2 \\ 1 & -2 \end{bmatrix}$

4. $\mathbf{D} = \begin{bmatrix} 2 & -1 \\ 3 & 3 \end{bmatrix}$ det(D) = 6 – (-3) = 9

   $\text{inv(D)} = 1/9\begin{bmatrix} 3 & 1 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} 1/3 & 1/9 \\ -1/3 & 2/9 \end{bmatrix}$

Find the determinant:

5. $\mathbf{E} = \begin{bmatrix} 2 & -1 & 3 \\ 3 & 3 & 4 \\ 5 & 2 & 7 \end{bmatrix}$ det(E) = 42 – 20 + 18 – 45 – 16 + 21 = 0

6. $\mathbf{F} = \begin{bmatrix} 2 & -1 & 3 \\ 3 & 3 & 4 \\ 1 & 2 & 2 \end{bmatrix}$ det(F) = 12 – 4 + 18 – 9 – 16 + 6 = 7