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Signature

1. Solve the following linear systems. If the solution set is infinite, parametrize it.

$$\textcircled{1} \begin{bmatrix} 1 & 3 & 1 & 1 & 1 \\ -4 & -9 & 2 & 1 & -1 \\ 0 & -3 & -6 & 1 & -3 \end{bmatrix}$$

$$\textcircled{2} \begin{bmatrix} 1 & -1 & 1 & 1 & 1 \\ 3 & 2 & -1 & 1 & 0 \\ 0 & 5 & -4 & 1 & -3 \end{bmatrix}$$

2. Determine whether the following sets of vectors are linear independent.

$$\textcircled{1} \left\{ \begin{bmatrix} 3 \\ 2 \\ -1 \\ -1 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \\ -1 \\ 0 \end{bmatrix} \right\}$$

$$\textcircled{2} \left\{ \begin{bmatrix} 2 \\ -5 \\ -3 \\ 1 \end{bmatrix}, \begin{bmatrix} 3 \\ 1 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 5 \\ -4 \\ -4 \\ 1 \end{bmatrix} \right\}$$

3. Use as many columns of the matrix A as possible to construct a matrix B , such that $BX=0$ has only trivial solution. ($X=0$)

$$A = \begin{bmatrix} 8 & -3 & 0 & -7 & 2 \\ -9 & 4 & 5 & 11 & -7 \\ 6 & -2 & 2 & -4 & 4 \\ 5 & -1 & 7 & 0 & 0 \end{bmatrix}$$

4. Let α be an angle between $0^\circ - 180^\circ$. Describe what does the following linear transform do to the real plane \mathbb{R}^2

$$\begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$$