Let $A = \begin{bmatrix} 0 & 2 & 2 & 4 & 2 & 4 \\ 1 & 6 & 3 & 9 & 2 & 3 \\ -2 & 3 & 4 & 12 & 3 & 8 \\ 3 & 6 & 0 & 3 & -1 & -5 \\ 1 & 2 & -1 & 1 & -1 & -3 \end{bmatrix}$; then rref$(A)$= $\begin{bmatrix} 1 & 0 & 0 & -3 & 0 & -1 \\ 0 & 1 & 0 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

Let $S = \{\mathbf{a}_1, \mathbf{a}_2, \ldots, \mathbf{a}_6\}$ be the set of column vectors of A.

1. Write all solutions of $A\mathbf{x} = \mathbf{0}$ in parametric vector form:

2. It's clear that S is LD. Which vectors in S *can* be expressed as linear combinations (LC's) of the other vectors? Don't write the vectors out; use their names ($\mathbf{a}_1$, $\mathbf{a}_2$, etc.) in a simple list instead.

3. If $\mathbf{a}_2$ can be written as a LC of the other vectors, find a way to do it using as few of the other vectors as possible. Otherwise, explain correctly why $\mathbf{a}_2$ is not a LC of the other vectors.

4. If $\mathbf{a}_3$ can be written as a LC of the other vectors, find a way to do it using as few of the other vectors as possible. Otherwise, explain correctly why $\mathbf{a}_3$ is not a LC of the other vectors.