Due April 28

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Name

Be sure to re-read the WRITING GUIDELINES rubric, since it defines how your project will be graded. In particular, you may discuss this project with others but **you may not collaborate on the written exposition of the solution.**

"*Without education we are in a horrible and deadly danger of taking educated people seriously.*" (G.K. Chesterton)

Linear Independence and Vector Representations

In Project 04 you were asked to prove the following statements using the definitions of linear dependence and linear independence. Use the powerful structure of vector representations to reprove the followning. The first two should be the easiest – particularly if you extend $\{w_1, w_2, w_3\}$ to a basis for $\mathbb{C}^{23}$. You will need to be a bit more careful with the second two.

1. If $\{w_1, w_2, w_3\}$ is a linearly **independent** set in $\mathbb{C}^{23}$, then the set
$$\{2w_1 + w_2 + 3w_3, -3w_1 + 2w_2 + 4w_3, w_1 + 2w_2 + 3w_3\}$$
is linearly independent.

2. If $\{w_1, w_2, w_3\}$ is a linearly independent set in $\mathbb{C}^{23}$, then the set
$$\{2w_1 + w_2 + 3w_3, -3w_1 + 2w_2 + 4w_3, w_1 - 3w_2 - 7w_3\}$$
is linearly dependent.

3. If $\{w_1, w_2, w_3\}$ is a linearly dependent set in $\mathbb{C}^{23}$, then the set
$$\{2w_1 + w_2 + 3w_3, -3w_1 + 2w_2 + 4w_3, w_1 + 2w_2 + 3w_3\}$$
is linearly dependent.

4. If $\{w_1, w_2, w_3\}$ is a linearly **dependent** set in $\mathbb{C}^{23}$, the the set
$$\{2w_1 + w_2 + 3w_3, -3w_1 + 2w_2 + 4w_3, w_1 - 3w_2 - 7w_3\}$$
is linearly dependent.

As before, you might find the following matrix information useful.

$$\begin{bmatrix} 2 & -3 & 1 \\ 1 & 2 & -3 \\ 3 & 4 & -7 \end{bmatrix} \xrightarrow{RREF} \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ 0 & 0 & 0 \end{bmatrix} \text{ and } \begin{bmatrix} 2 & -3 & 1 \\ 1 & 2 & 2 \\ 3 & 4 & 3 \end{bmatrix} \xrightarrow{RREF} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$