

1. Consider the system of equations
- $$\begin{aligned}x_1 + 2x_2 + 4x_3 &= 21 \\4x_1 + 7x_2 + 13x_3 &= 72 \\3x_1 + 4x_2 + 6x_3 &= 39.\end{aligned}$$

1A. Use your calculator to find the RREF of the augmented matrix corresponding to this system and write the answer here.

1B. What does the answer to (1A) tell us the solution to the system is? (Answer using the standard notation developed in class)

1C. Suppose the “4” in the *third* equation in the above system is replaced by a “5”. What is the RREF of the augmented matrix corresponding to this *new* system?

1D. What is the solution of the *new* system described in part (1C)? Verify that it works!

2. Let $\mathbf{v}_1 = \begin{bmatrix} 1 \\ 4 \\ 3 \end{bmatrix}$, $\mathbf{v}_2 = \begin{bmatrix} 2 \\ 7 \\ 4 \end{bmatrix}$, $\mathbf{v}_3 = \begin{bmatrix} 4 \\ 13 \\ 6 \end{bmatrix}$, and $\mathbf{b} = \begin{bmatrix} 21 \\ 72 \\ 39 \end{bmatrix}$.

2A. If possible, express the vector \mathbf{b} as a linear combinations of the vectors \mathbf{v}_1 , \mathbf{v}_2 , and \mathbf{v}_3 in *two different ways*, or explain why this cannot be done.

2B. Is $\mathbf{c} = \begin{bmatrix} 22 \\ 73 \\ 40 \end{bmatrix}$ in the span of \mathbf{v}_1 , \mathbf{v}_2 , and \mathbf{v}_3 ? Fully explain your answer. Write down any matrices which support your conclusion.