2. Given another system, $B\mathbf{r} = \mathbf{t}$, **1 / 1 punto**

$$\begin{array}{l} ① : \\ ② : \\ ③ : \end{array} \begin{bmatrix} 4 & 6 & 2 \\ 3 & 4 & 1 \\ 2 & 8 & 13 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9 \\ 7 \\ 2 \end{bmatrix}$$

We wish to convert this to echelon form, by using elimination. Starting with the first row, ①, if we divide the whole row by 4, then the top-left element of the matrix becomes 1,

$$\begin{array}{l} ①' : \\ ②' : \\ ③' : \end{array} \begin{bmatrix} 1 & 3/2 & 1/2 \\ 3 & 4 & 1 \\ 2 & 8 & 13 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ 7 \\ 2 \end{bmatrix}$$

Next, we need to fix the second row. This results in the following,

$$\begin{array}{l} ①'' : \\ ②'' : \\ ③'' : \end{array} \begin{bmatrix} 1 & 3/2 & 1/2 \\ 0 & 1 & 1 \\ 2 & 8 & 13 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ 2 \end{bmatrix}$$

What steps did we take?

- (●) The new second row, $②''$ is the old second row minus three times the old first row, then all multiplied by -2, i.e., $②'' = [②' - 3①'] \times (-2)$.
- ( ) The new second row, $②''$ is the old second row minus three, i.e., $②'' = ②' - 3$.
- ( ) The new second row, $②''$ is the old second row minus two times the old first row, i.e., $②'' = [②' - 2①']$.
- ( ) The new second row, $②''$ is the old second row divided by four minus the old first row, i.e., $②'' = ②'/4 - ①'$.

Correcto
We've made the new second row a linear combination of previous rows.

3. From the previous question, our system is almost in echelon form. **1 / 1 punto**

$$\begin{array}{c} ①'' \\ ②'' \\ ③'' \end{array}\begin{bmatrix} 1 & 3/2 & 1/2 \\ 0 & 1 & 1 \\ 2 & 8 & 13 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ 2 \end{bmatrix}$$

Fix row 3 to be a linear combination of the other two. What is the echelon form of the system?

- (selected) $\begin{bmatrix} 1 & 3/2 & 1/2 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ 0 \end{bmatrix}$

- $\begin{bmatrix} 1 & 3/2 & 1/2 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ 1/2 \end{bmatrix}$

- $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ -1/4 \end{bmatrix}$

- $\begin{bmatrix} 1 & 3/2 & 1/2 \\ 0 & 1 & 1 \\ 0 & 5 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ -5/2 \end{bmatrix}$

✓ **Correcto**

This system is now in echelon form.

4. Taking your answer from the previous part, use back substitution to solve the system. **1 / 1 punto**

What is the value of $\begin{bmatrix} a \\ b \\ c \end{bmatrix}$?

- (selected) $\mathbf{r} = \begin{bmatrix} 3 \\ -1/2 \\ 0 \end{bmatrix}$

○ $\mathbf{r} = \begin{bmatrix} 9/4 \\ -1/2 \\ 0 \end{bmatrix}$

○ $\mathbf{r} = \begin{bmatrix} 3/2 \\ 1/2 \\ 1 \end{bmatrix}$

○ $\mathbf{r} = \begin{bmatrix} 9 \\ 7 \\ 2 \end{bmatrix}$

Correcto
Well done!

5. Let's return to the apples and bananas from Question 1.

Take your answer to Question 1 and convert the system to echelon form. I.e.,

$$\begin{bmatrix} 1 & A'_{12} & A'_{13} \\ 0 & 1 & A'_{23} \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} s'_1 \\ s'_2 \\ s'_3 \end{bmatrix}.$$

Find values for A' and $\mathbf{s}'$.