1. Perform Gaussian elimination without row interchange on the following augmented matrix: 1 / 1 punto

$$\begin{pmatrix} 1 & -2 & 1 & 0 \\ 2 & 1 & -3 & 5 \\ 4 & -7 & 1 & -2 \end{pmatrix}$$

Which matrix can be the result?

- (●) $\begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -2 & -3 \end{pmatrix}$
- ( ) $\begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -2 & 3 \end{pmatrix}$
- ( ) $\begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -3 & -2 \end{pmatrix}$
- ( ) $\begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -3 & 2 \end{pmatrix}$

Correcto

2. Which matrix is not in reduced row echelon form? 1 / 1 punto

- ( ) $\begin{pmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 2 \end{pmatrix}$
- ( ) $\begin{pmatrix} 1 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- (●) $\begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$
- ( ) $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Correcto

3. The inverse of $\begin{pmatrix} 3 & -7 & -2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{pmatrix}$ is 1 / 1 punt

- ( ) $\begin{pmatrix} 4/3 & 2/3 & 1/2 \\ 2 & 1 & 1/2 \\ -3 & -5 & -1 \end{pmatrix}$
- ( ) $\begin{pmatrix} 2/3 & 1/2 & 4/3 \\ 1 & 1/2 & 2 \\ -3 & -5 & -1 \end{pmatrix}$
- ( ) $\begin{pmatrix} 2/3 & 4/3 & 1/2 \\ 1 & 2 & 1/2 \\ -5 & -3 & -1 \end{pmatrix}$
- (●) $\begin{pmatrix} 2/3 & 4/3 & 1/2 \\ 1 & 2 & 1/2 \\ -3 & -5 & -1 \end{pmatrix}$

Correcto

1. Which of the following is the elementary matrix that multiplies the second row of a four-by-four matrix by 2 and adds the result to the third row? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 2 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- (selected) $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 2 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 \end{pmatrix}$

Correcto

2. Which of the following is the LU decomposition of $\begin{pmatrix} 3 & -7 & -2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{pmatrix}$? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & -5 & 1/2 \end{pmatrix} \begin{pmatrix} 3 & -7 & -2 \\ 0 & -2 & -1 \\ 0 & 0 & -2 \end{pmatrix}$
- (selected) $\begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & -5 & 1 \end{pmatrix} \begin{pmatrix} 3 & -7 & -2 \\ 0 & -2 & -1 \\ 0 & 0 & -1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ -1 & 2 & -1 \\ 2 & -10 & 6 \end{pmatrix} \begin{pmatrix} 3 & -7 & -2 \\ 0 & -1 & -1 \\ 0 & 0 & -1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 4 & -5 & 1 \end{pmatrix} \begin{pmatrix} 3 & -7 & -2 \\ 0 & -2 & -1 \\ -6 & 14 & 3 \end{pmatrix}$

Correcto

3. Suppose $\mathrm{L} = \begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & -5 & 1 \end{pmatrix}, \mathrm{U} = \begin{pmatrix} 3 & -7 & -2 \\ 0 & -2 & -1 \\ 0 & 0 & -1 \end{pmatrix}$, and $\mathrm{b} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$. Solve $\mathrm{LUx} = \mathrm{b}$ by letting $\mathrm{y} = \mathrm{Ux}$. The solutions for y and x are 1 / 1 punto

- $\mathrm{y} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 1/6 \\ 1/2 \\ -1 \end{pmatrix}$
- (selected) $\mathrm{y} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} -1/6 \\ -1/2 \\ 1 \end{pmatrix}$
- $\mathrm{y} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 1/6 \\ -1/2 \\ 1 \end{pmatrix}$
- $\mathrm{y} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} -1/6 \\ 1/2 \\ 1 \end{pmatrix}$

Correcto

1. The system of equations given by **1 / 1 punto**

$2x_1 + 2x_2 + x_3 = 5,$

$x_1 + 3x_2 + x_3 = 2,$

$3x_1 + 4x_2 + 5x_3 = 1,$

is written in matrix form as

- ○ $\begin{pmatrix} 2 & 1 & 3 \\ 2 & 3 & 4 \\ 1 & 1 & 5 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix}$
- ◉ $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 3 & 4 & 5 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 2 & 2 & 1 & 5 \\ 1 & 3 & 1 & 2 \\ 3 & 4 & 5 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$
- ○ $\begin{pmatrix} x_1 & x_2 & x_3 \end{pmatrix} \begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 3 & 4 & 5 \end{pmatrix} = \begin{pmatrix} 5 & 2 & 1 \end{pmatrix}$

2. The augmented matrix for the system of equations **1 / 1 punto**

$2x_1 + 2x_2 + x_3 = 5,$

$x_1 + 3x_2 + x_3 = 2,$

$3x_1 + 4x_2 + 5x_3 = 1,$

is given by

- ○ $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 3 & 4 & 5 \end{pmatrix}$
- ○ $\begin{pmatrix} 2x_1 & 2x_2 & x_3 & 5 \\ x_1 & 3x_2 & x_3 & 2 \\ 3x_1 & 4x_2 & 5x_3 & 1 \end{pmatrix}$
- ◉ $\begin{pmatrix} 2 & 2 & 1 & 5 \\ 1 & 3 & 1 & 2 \\ 3 & 4 & 5 & 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 5 & 2 & 2 & 1 \\ 2 & 1 & 3 & 1 \\ 1 & 3 & 4 & 5 \end{pmatrix}$

3. Perform Gaussian elimination without row interchange on the following augmented matrix: **1 / 1 punto**

$$\begin{pmatrix} 1 & 2 & -1 & 2 \\ 2 & 6 & 3 & 7 \\ 1 & 4 & 2 & 9 \end{pmatrix}.$$

Which matrix can be the result?

- ○ $\begin{pmatrix} 1 & 2 & -1 & 2 \\ 0 & 2 & 5 & 3 \\ 0 & 0 & 2 & 4 \end{pmatrix}$
- ◉ $\begin{pmatrix} 1 & 2 & -1 & 2 \\ 0 & 2 & 5 & 3 \\ 0 & 0 & -2 & 4 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 & 2 & -1 & 2 \\ 0 & 2 & 5 & 3 \\ 0 & 0 & 4 & 2 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 & 2 & -1 & 2 \\ 0 & 2 & 5 & 3 \\ 0 & 0 & -4 & 2 \end{pmatrix}$

✓ Correcto

4. Which matrix is not in reduced row echelon form? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & -1 \end{pmatrix}$
- $\begin{pmatrix} 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$

Correcto

5. The inverse of $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$ is 1 / 1 punto

- $\begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & 1 \end{pmatrix}$
- $\begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ -1 & 1 & 1 \end{pmatrix}$
- $\begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ 1 & -1 & 1 \end{pmatrix}$
- $\begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & -1 \end{pmatrix}$

Correcto

6. Which of the following is the elementary matrix that multiplies the third row of a four-by-four matrix by 2 and adds the result to the fourth row? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 2 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 2 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 \end{pmatrix}$

Correcto

7. Which of the following is the LU decomposition of $\begin{pmatrix} 2 & -2 & 1 \\ 4 & -2 & 3 \\ -4 & 8 & -2 \end{pmatrix}$? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -2 & 2 & 1/2 \end{pmatrix} \begin{pmatrix} 2 & -2 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & -4 \end{pmatrix}$
- **(selected)** $\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -2 & 2 & 1 \end{pmatrix} \begin{pmatrix} 2 & -2 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & -2 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 1/2 \\ -2 & 2 & 2 \end{pmatrix} \begin{pmatrix} 2 & -2 & 1 \\ 0 & 2 & 2 \\ 0 & 0 & -2 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -2 & 1 & 1 \end{pmatrix} \begin{pmatrix} 2 & -2 & 1 \\ 0 & 2 & 1 \\ 0 & 2 & -1 \end{pmatrix}$

Correcto

8. Suppose $\mathrm{L} = \begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ -2 & -5 & 1 \end{pmatrix}, \mathrm{U} = \begin{pmatrix} 6 & -7 & 2 \\ 0 & -7 & -1 \\ 0 & 0 & -1 \end{pmatrix}$, and $\mathrm{b} = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$. Solve $\mathrm{LUx} = \mathrm{b}$ by letting $\mathrm{y} = \mathrm{Ux}$. The solutions for y and x are 1 / 1 punto

- $\mathrm{y} = \begin{pmatrix} 1 \\ 1 \\ 8 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 1 \\ 4 \\ -8 \end{pmatrix}$
- **(selected)** $\mathrm{y} = \begin{pmatrix} 1 \\ 1 \\ 8 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 4 \\ 1 \\ -8 \end{pmatrix}$
- $\mathrm{y} = \begin{pmatrix} 8 \\ 1 \\ 1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 1 \\ 4 \\ -8 \end{pmatrix}$
- $\mathrm{y} = \begin{pmatrix} 8 \\ 1 \\ 1 \end{pmatrix}, \mathrm{x} = \begin{pmatrix} 4 \\ 1 \\ -8 \end{pmatrix}$

Correcto

9. Suppose $\mathrm{M} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 3 & 1 \end{pmatrix}$. Which matrix is M^{-1}? 1 / 1 punto

- $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -3 \\ 0 & 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 3 & 1 \end{pmatrix}$
- **(selected)** $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -3 & 1 \end{pmatrix}$

Correcto

10. From Gaussian elimination, one obtains $\mathrm{M_3M_2M_1A} = \mathrm{U}$, where U is upper triangular. If $\mathrm{A} = \mathrm{LU}$, which is the lower triangular matrix L? 1 / 1 punto

- $\mathrm{M_1M_2M_3}$
- $\mathrm{M_3M_2M_1}$
- **(selected)** $\mathrm{M_1^{-1}M_2^{-1}M_3^{-1}}$
- $\mathrm{M_3^{-1}M_2^{-1}M_1^{-1}}$

Correcto