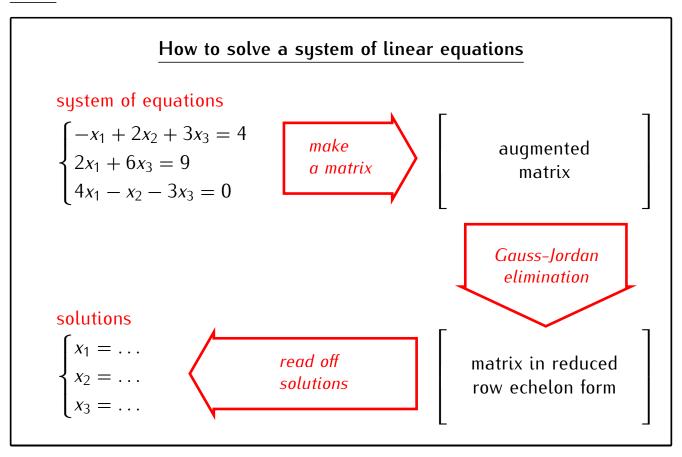
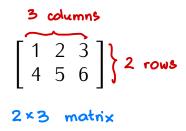
# Next:

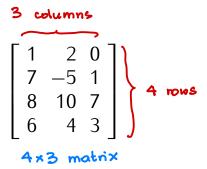


#### **Matrices**

matrix = rectangular array of numbers

### Example.



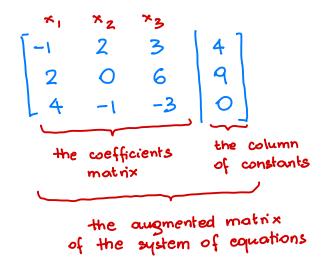


#### Note

Every system of linear equations can be represented by a matrix.

# Example.

$$\begin{cases}
-x_1 + 2x_2 + 3x_3 = 4 \\
2x_1 + 6x_3 = 9 \\
4x_1 - x_2 - 3x_3 = 0
\end{cases}$$



# Elementary row operations:

1) Interchange of two rows.

### Example.

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 5 & 1 \\ 4 & 3 & 0 & 7 \end{bmatrix} \longrightarrow \begin{bmatrix} 4 & 3 & 0 & 7 \\ 0 & 1 & 5 & 1 \\ 1 & 2 & 3 & 4 \end{bmatrix}$$

2) Multiplication of a row by a non-zero number.

### Example.

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 5 & 1 \\ 4 & 3 & 0 & 7 \end{bmatrix} \longrightarrow \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 5 & 1 \\ 8 & 6 & 0 & 14 \end{bmatrix}$$

3) Addition of a multiple of one row to another row.

## Example.

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

$$\longrightarrow \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 7 & 14 & 13 \\ 4 & 3 & 0 & 7 \end{bmatrix}$$

### **Proposition**

Elementary row operations do not change solutions of the system of equations represented by a matrix.

