In general:

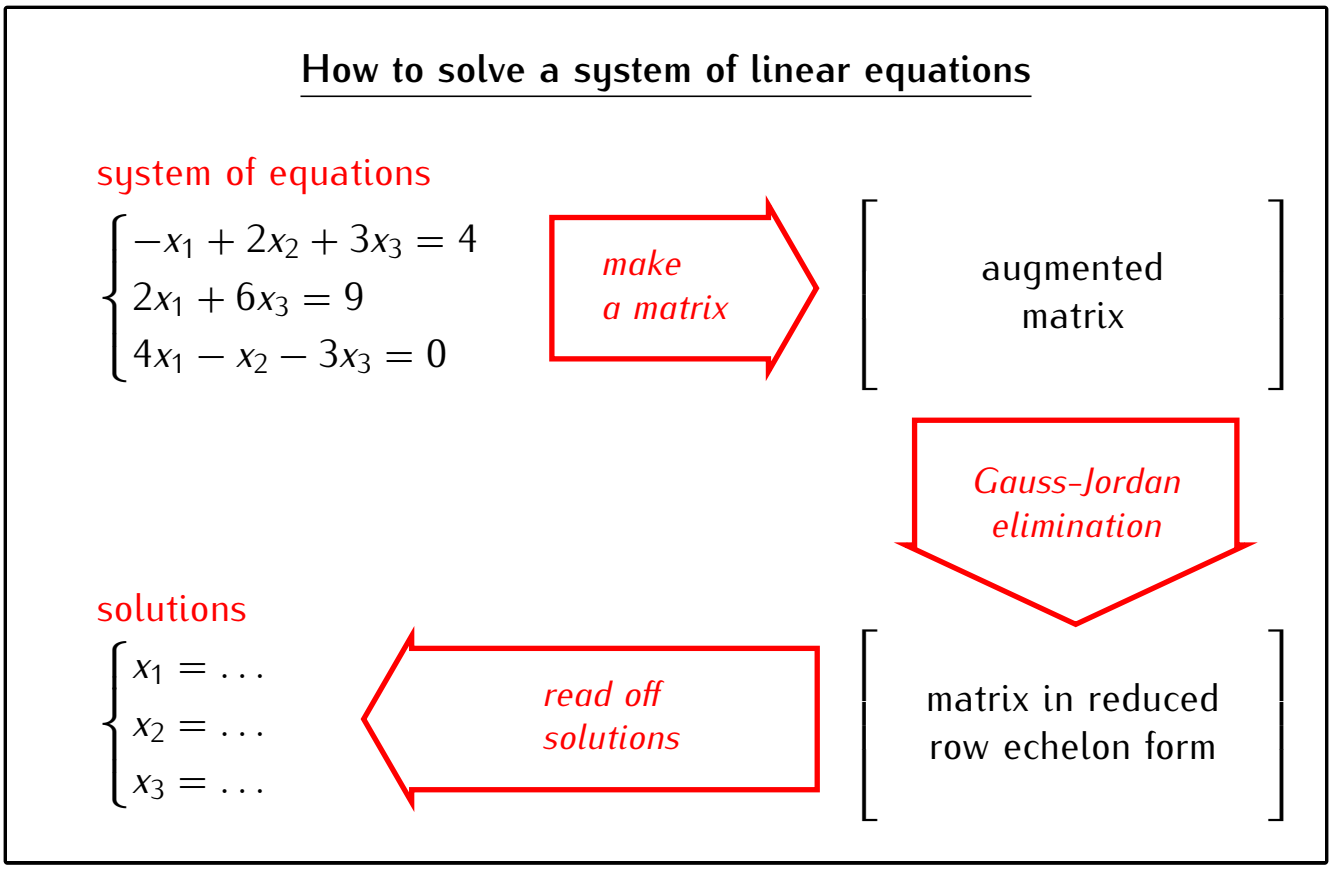
A system of linear equations can have either

- no solutions
- exactly one solution
- infinitely many solutions

Definition

If as system of linear equations which has no solutions is called an *inconsistent system*. Otherwise the system is *consistent*.

Next:


How to solve a system of linear equations
system of equations
$\begin{cases} -x_1 + 2x_2 + 3x_3 = 4 \\ 2x_1 + 6x_3 = 9 \\ 4x_1 - x_2 - 3x_3 = 0 \end{cases}$
make a matrix
augmented matrix
Gauss-Jordan elimination
matrix in reduced row echelon form
read off solutions
solutions
$\begin{cases} x_1 = \dots \\ x_2 = \dots \\ x_3 = \dots \end{cases}$

Matrices

matrix = rectangular array of numbers

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.

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

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