

Linear Algebra – MAT 2610

Section 0 (Background)

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Systems of Two Linear Equations

$$a_1x_1 + b_1x_2 = c_1$$

$$a_2x_1 + b_2x_2 = c_2$$

Solving this system means to find values for the variables that satisfy both equations

Systems of Two Linear Equations - Example

$$\begin{aligned}2x_1 + 3x_2 &= 11 \\ -2x_1 + 2x_2 &= -6\end{aligned}$$

Solving this system:

- Elimination method
- Substitution method
- Graphical method

Elimination Method

1. Add the equations to eliminate x_1

$$\begin{aligned}2x_1 + 3x_2 &= 11 \\ -2x_1 + 2x_2 &= -6\end{aligned}$$

2. Multiply and add the equations to eliminate x_2

$$2x_1 + 3x_2 = 11$$

$$-2x_1 + 2x_2 = -6$$

Substitution Method

1. Express one equation in terms of a single variable

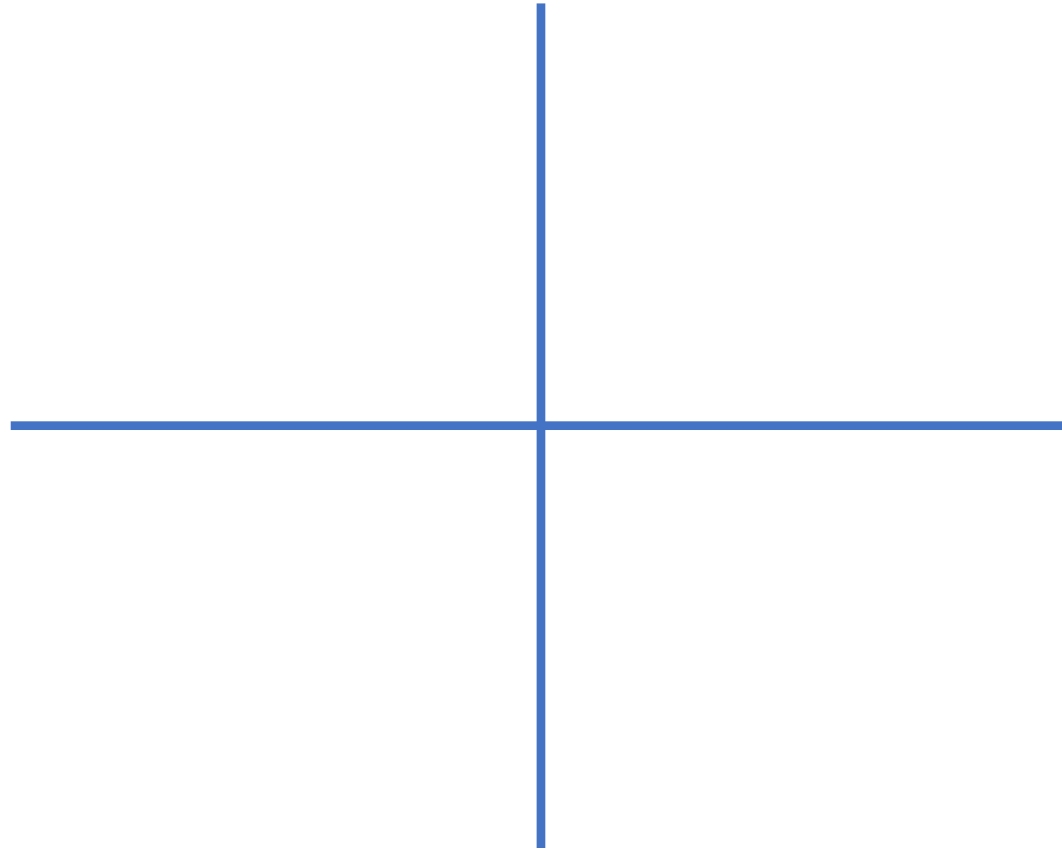
$$\begin{aligned}2x_1 + 3x_2 &= 11 \\ -2x_1 + 2x_2 &= -6\end{aligned}$$

2. Substitute that equation into the second equation

$$\begin{aligned}2x_1 + 3x_2 &= 11 \\ -2x_1 + 2x_2 &= -6\end{aligned}$$

Graphical Method

$$\begin{aligned}2x_1 + 3x_2 &= 11 \\ -2x_1 + 2x_2 &= -6\end{aligned}$$



Other examples

$$\begin{aligned}2x_1 - 3x_2 &= 11 \\ -2x_1 + 3x_2 &= -6\end{aligned}$$

Other examples

$$2x_1 - 3x_2 = 11$$

$$-2x_1 + 3x_2 = -11$$

Consistent

A system of linear equations is said to be **consistent** if it has at least one solution.

If not, it is **inconsistent**.

We will see that any system of linear equations that is consistent has either exactly one or infinitely many solutions.