Linear Algebra
MATH 1201

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1 Linear Equations in Linear Algebra

1.1 Systems of Linear Equations

Linear equation: An equation of the form $a_1x_1+a_2x_2+\cdots+a_nx_n = b$ where $a_1, a_2, \ldots, a_n, b$ are constants and $x_1, x_2, \ldots, x_n$ are variables.

Solution set: All possible solutions to a system of linear equations.

Definition

Types of solutions: There are only three types of solutions a system of linear equations can have.

- No solution
- Exactly one solution
- Infinitely many solutions

If we have a system of linear equations that looks like:

$$\begin{aligned} x_1 - 2x_2 \quad &+x_3 = 0 \\ x_2 \quad &+2x_3 = 3 \\ 3x_1 + x_2 \quad &+3x_3 = 3 \end{aligned}$$

Coefficient matrix: Way of writing a system of linear equations