

Systems of Linear Equations

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Jun 01, 2024

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Based on

A First Course in Linear Algebra, R. A. Beezer

<http://linear.ups.edu/fcla/front-matter.html>

Outline

- 1 Systems of Linear Equations
 - Solving systems of linear equations

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System of a Linear Equations

Definition

System of Linear Equations.

A system of linear equations is a collection of m equations in the variable quantities $x_1, x_2, x_3, \dots, x_n$ of the form,

$$\begin{aligned}a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + \cdots + a_{1n}x_n &= b_1 \\a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + \cdots + a_{2n}x_n &= b_2 \\a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \cdots + a_{3n}x_n &= b_3 \\&\vdots \\a_{m1}x_1 + a_{m2}x_2 + a_{m3}x_3 + \cdots + a_{mn}x_n &= b_m\end{aligned}$$

where the values of a_{ij} , b_i and x_j , $1 \leq i \leq m$, $1 \leq j \leq n$, are from the set of complex numbers, \mathbb{C} .

Solution of a system of a linear equations

Definition

Solution of a System of Linear Equations.

A solution of a system of linear equations in n variables, $x_1, x_2, x_3, \dots, x_n$,

is an ordered list of n complex numbers, $s_1, s_2, s_3, \dots, s_n$ such that if we substitute s_1 for x_1 , s_2 for x_2 , s_3 for x_3 , \dots , s_n for x_n , then for every equation of the system the left side will equal the right side, i.e. each equation is true simultaneously.

