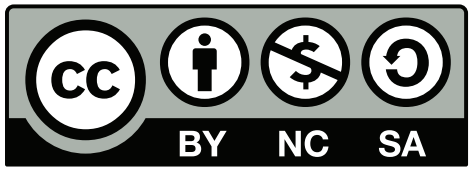
Systems of Linear Equations

Young W Lim

Jun 01, 2024



Based on
A First Course in Linear Algebra, R. A. Beezer
http://linear.ups.edu/fcla/front-matter.html

Outline

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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 $x_1, x_2, x_3, \ldots, x_n$ of the form,

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

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, $x_1, x_2, x_3, \ldots, x_n$,
is an ordered list of n complex numbers, s1,s2,s3,. . . ,sn such that if we substitute s1 for x1, s2 for x2, s3 for x3, . . . , sn for xn, then for every equation of the system the left side will equal the right side, i.e. each equation is true simultaneously.