

Math 240: ARM 0131 (old class)

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Book - Linear Algebra & its Applications

Chapter 1: System of linear equations

Intro:

Linear equation:

$$a_1x_1 + a_2x_2 + \dots + a_nx_n = b$$

$b, a_1, \dots, a_n =$ coefficients

$x_1, x_2, \dots, x_n =$ variables

Ex: $3x_1 - 2x_2 = 4x_1 - x_3 + 2$

$-x_1 - 2x_2 + x_3 = 2$ (3 variables)

System of linear equations: collection of linear equations

ex: $\begin{cases} -x_1 - 2x_2 + x_3 = 2 \\ 2x_1 + x_2 - x_3 = 0 \end{cases}$

2 equations & 3 variables

Solution = list (s_1, s_2, \dots, s_n) that makes every equation of the system true.

When we substitute s_1, \dots, s_n for x_1, \dots, x_n .

ex $\begin{cases} x_1 - 3x_2 = 7 \\ 2x_1 + x_2 = 0 \end{cases}$

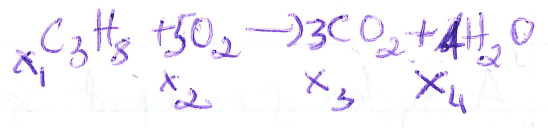
2 eq with 2 var

$(1, -2)$ is a solution

Solution set = set of all the solutions of a system.

2 systems are equivalent if they have exactly the same solution set.

example:



Atoms of carbon: $3x_1 = x_3$

Atoms of O: $2x_2 = 2x_3 + x_4$

Atoms of H: $8x_1 = 2x_4$

$$\begin{cases} 3x_1 - x_3 = 0 \\ 2x_2 - 2x_3 - x_4 = 0 \\ 8x_1 - 2x_4 = 0 \end{cases}$$

$(1, 5, 3, 4)$ is a solution
 $(2, 10, 6, 8)$ is another solution

repare C_3H_8