// Matrices and linear system

// vector spaces

// Linear transformation

* A linear equation in n variables $x_1, x_2 \cdots x_n$

is of the form

$$a_1 x_1 + a_2 x_2 + \cdots a_n x_n = b$$

$a_1, a_2, \cdots a_n, b$ are constants and $a_1, a_2, \cdots a_n$ are not all zero.

Example:

2 variable | $3x + 2y = 1$ → equation of a line
$ax + by = c$

3 variable | $x + 2y - 3z = 5$ → equation of plane

more variables | $2x_1 + 3x_2 - x_3 + x_4 = 2$ → eq. of a 4-D hyper-plane

Non example:

- → No power of variables
- → No ~~*~~ multiplying variable together.
- → variable cannot be argument of trig, log, exp

linear: $2x + \ln(3)\, y = 2$

non linear: $2x + 3\ln(y) = 2$

$$2xy + 3y = 6$$

$$2x^2 + 3y = 7$$

A soln to a linea equation is a sequence of number $t_1, \ldots t_n$ such that

$$a_1t_1 + a_2t_2 + \cdots + a_nt_n = b$$ is a true

statement.

The set of all soln of a linear eq. is called the solution set.

Example:

$3x+2y = 1$ Let $x = t$, where $t \in \mathbb{R}$

$y = -\frac{3}{2}x + \frac{1}{2}$

Soln set: $\{\, y \mid y = \frac{-3}{2}t + \frac{1}{2},\ t \in \mathbb{R} \}$

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$x = -\frac{2}{3}y + \frac{1}{3}$ $\{x \mid x = \frac{-2}{3}s + \frac{1}{3}\}$