Math 1ZC3

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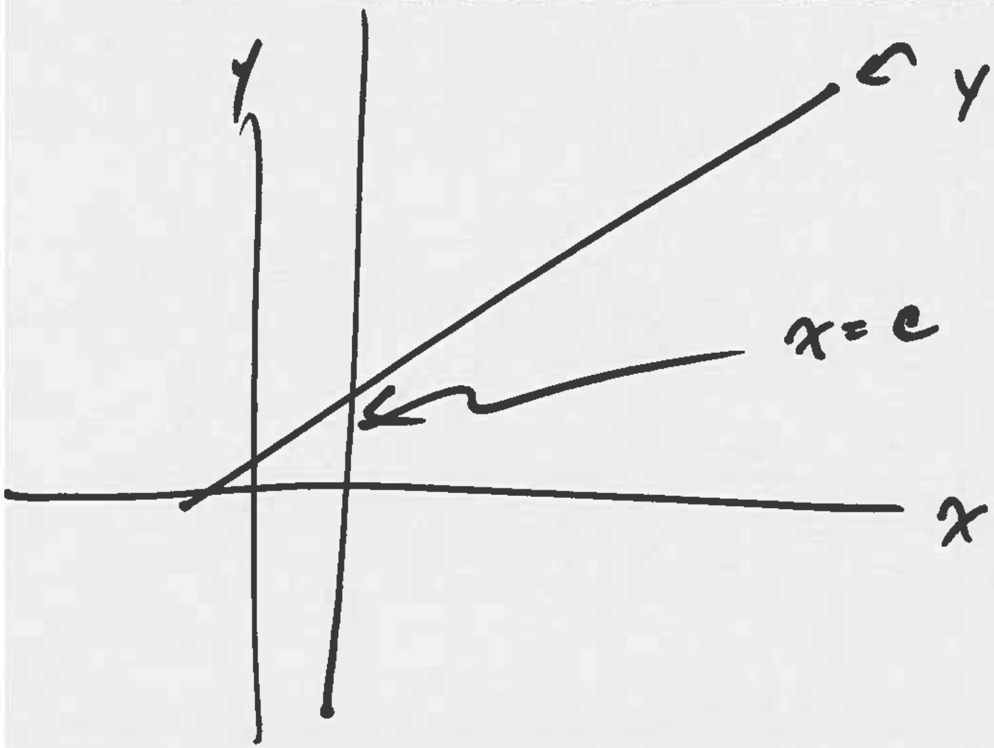
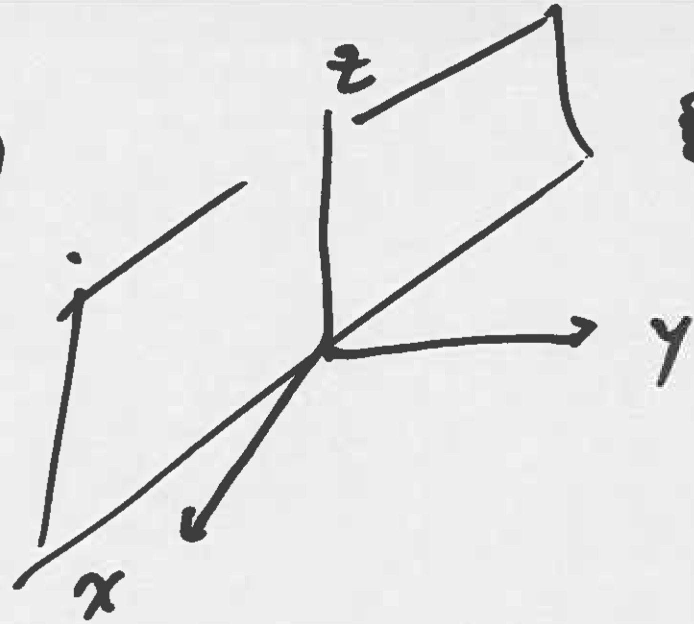
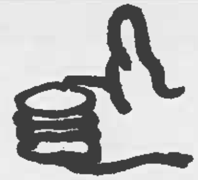


$$\left.\begin{array}{l} y = mx + b \\ \\ \end{array}\right\} \quad \overset{\text{const.}}{a}x + \overset{\text{coeff.}}{b}y = \underset{\text{const}}{c}$$

variables

(x, y, z)





constant coeff.

constant

$$ax + by + cz = d$$

variables

A general linear equation has form:

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

where $a_1, a_2, \dots$ i.e. a_i = const. coeff.

$x_1, x_2 \dots$ ie x_i = variables

b = constant

generalizes lines & planes in n variables!

A linear system is a set of linear equations in the same variables

e.g. $\begin{cases} x + y = 2 \\ 2x - y = 5 \end{cases}$

e.g. $\begin{cases} 2u - 3v + 6w = 12 \\ 8u - 2v + 0w = 16 \end{cases}$

e.g. $\begin{cases} 2u + 5v = 6 \\ 6x - 3y = 5 \end{cases} \Rightarrow \begin{cases} 2u + 5v + 0x + 0y = 6 \\ 0u + 0v + 6x - 3y = 5 \end{cases}$

A solution to a linear system is a set of values of the variables that satisfy all equations in that linear system.

eg. $\begin{cases} x + y = 2 \\ x - y = 4 \end{cases}$ $\longrightarrow$ $x = 2 - y$

$\underline{\underline{so}}$ $2 - y - y = 4$

$-2y = 2$

$\underline{\underline{y = -1}}$, $x = 2 - (-1) = \underline{\underline{3}}$

Solution

$\underline{\underline{(x, y) = (3, -1)}}$

eg $\left.\begin{cases} x + y - z = 2 \\ x + y - z = 12 \end{cases}\right\}$ inconsistent

$\underline{\underline{\text{no}}}$ $\underline{\underline{\text{solutions}}}$

" parallel planes "

(3D!)

eg $\left(2x + 3y - 2z = 0 \right)$

$$\begin{cases} 2x + 5y - 2z = 0 \\ x + y - z = 0 \end{cases}$$

all const are $\underline{\underline{0}}$

$\Rightarrow$ homogeneous system

All homog. systems have at least the "trivial" all-zero solution!

e.g. here: $(x, y, z) = (0, 0, 0)$

notice any $\begin{cases} x = t \\ y = 0 \\ z = t \end{cases}$ or $(x, y, z) = t(1, 0, 1)$

all solutions

so $\underline{\underline{\infty}}$ solutions!