8 Aug 2017

Equation

variable

$$2x + 4 = 16$$ คงที่

$$\boxed{x = 6}$$

สปส

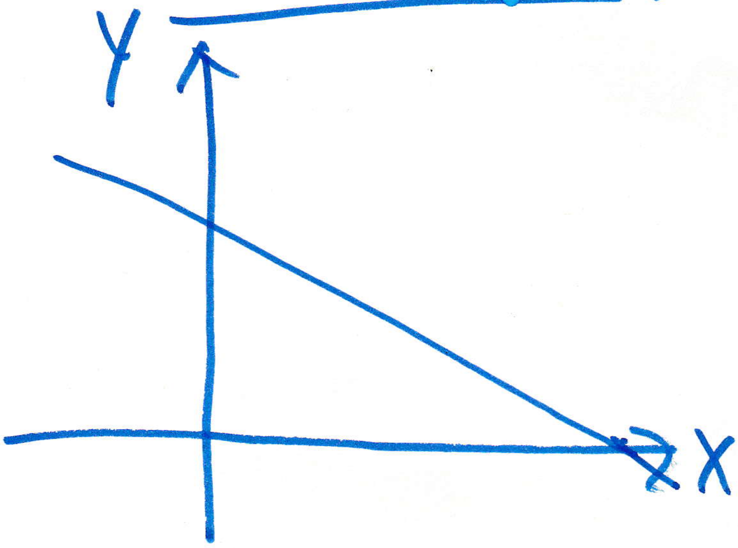
coefficient

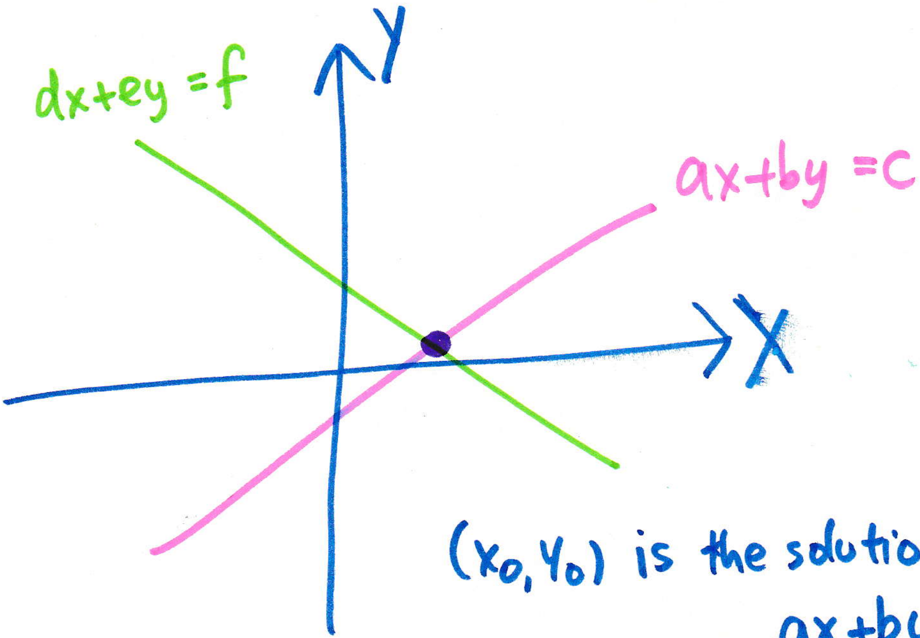
Degree 1

linear equation

line

$$\boxed{ax + by = c}$$





(x_0, y_0) is the solution of

$$ax + by = c \quad — ①$$
$$dx + ey = f \quad — ②$$

Chapter 1: Matrices and Systems of Linear Equations

(Some contents of this note are taken from "Barnett/Ziegler/Byleen College Mathematics 12e" with modifications)

Overview

1. To solve systems of linear equations in two variables by 3 methods
   - Graphing
   - Substitution
   - Elimination by addition
2. Matrices
   - Systems of linear equations and augmented matrices
   - Elementary row operations and Gauss Jordan elimination
   - Basic operations of matrices, inverse matrix and matrix equations

Systems of two equations in two variables

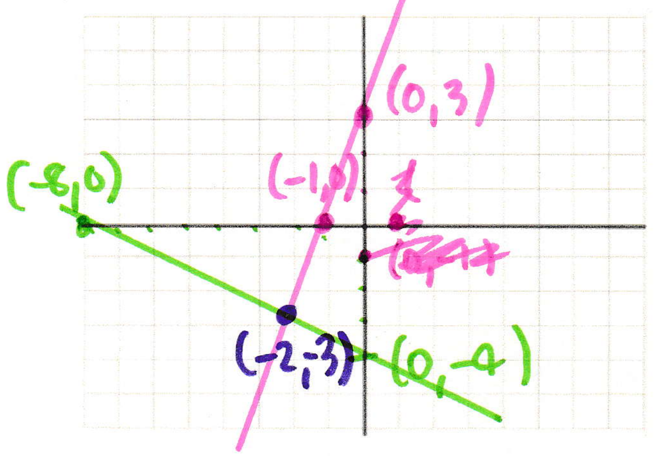
We are given the linear system

$$\left.\begin{aligned} ax + by &= h \\ cx + dy &= k \end{aligned}\right\}$$ system of linear equation

A *solution* is an ordered pair (x_0, y_0) that will satisfy each equation. The solution set is the set of all ordered pairs that satisfy both equations.

Check that $\boxed{(-2,-3)}$ is a solution of the system
$$\begin{aligned} 3x - y &= -3 \quad \text{—} ① \\ x + 2y &= -8 \quad \text{—} ② \end{aligned}$$

Example 1 Solve the above system by graphing. (Note that you can only 'guess' the answer from where the two lines intersect.)



$\boxed{3x - y = -3}$ — ①

$\boxed{x + 2y = -8}$ — ②

จุดตัดแกน x ให้ y = 0
x = -1

จุดตัดแกน y ให้ x = 0
y = 3

จุดตัดแกน x ให้ y = 0
x = -8 (-8,0)

y ให้ x = 0
y = -4 (0,-4)

There is another method, which is 100% accurate, called the **method of substitution.**

Example 2 Solve the above system by substitution and compare the result

$3x - y = -3$ — ①

$x + 2y = -8$ — ②

จาก ① $y = ?$

$\boxed{y = 3x + 3}$

แทน $y = 3x + 3$ ใน ② จะได้

$x + 2(3x + 3) = -8$

$x + 6x + 6 = -8$

$7x = -14$

$\boxed{x = -2}$

แทน $x = -2$ ใน $y = 3x + 3$ ได้ว่า $y = 3(-2) + 3 = -3$

∴ คำตอบของระบบสมการคือ $(-2, -3)$

A better method is called **elimination by addition**. It can also generalize to larger systems. The following operations can be used to produce equivalent systems:

1. Two equations can be interchanged.

$3x - y = -3$ — ①　　$x + 2y = -8$ — ①'

$x + 2y = -8$ — ②　$\longleftrightarrow$　$3x - y = -3$ — ②'

2. An equation can be multiplied by a non-zero constant.

① $3x - y = -3$ — (1)

คูณ ① ด้วย 2 ทั้งสองข้าง

$2 \times$ ① $6x - 2y = -6$ — ③

3. A constant multiple of one equation can be added to another equation

$3x - y = -3$ — ①　$\xrightarrow{2 \times ①}$ ได้　$6x - 2y = -6$ — ③

$x + 2y = -8$ — ②　　　　$x + 2y = -8$ — ②

$7x + 0 = -14$

Example 3 Solve the above system using elimination by addition and compare the result.

$x = -2$

แทน $x = -2$ ใน ②

$(-2) + 2(y) = -8$

$2y = -6$

$y = -3$