
EECS 16A Designing Information Devices and Systems I
Fall 2019 Discussion 1B

1. Systems of Equations

Solve the following systems of equations, or if there is no solution, explain why. Can you visualize these geometrically?

(a)

$$\begin{cases} 2x + y = 6 \\ 3x - 2y = 2 \end{cases}$$

(b)

$$\begin{cases} x + y + z = 2 \\ x - y = 1 \\ 2y + z = 1 \end{cases}$$

(c)

$$\begin{cases} 6x + 2y = 15 \\ 3x + y = 7 \end{cases}$$

2. Vectors

Introduction to vectors and vector addition.

Definitions:

Vector: An ordered list of elements - for example:

$$\vec{x} = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \in \mathbb{R}^n$$

\mathbb{R} or \mathbb{R}^1 : The set of all real numbers (i.e. the real line)

\mathbb{R}^2 : The set of all two-element vectors with real numbered entries (i.e. plane of 2×1 vectors) - for example:

$$\vec{v} = \begin{bmatrix} 2 \\ 5 \end{bmatrix} \in \mathbb{R}^2$$

\mathbb{R}^3 : The set of all three-element vectors with real numbered entries (i.e. 3-space of 3×1 vectors) - for example:

$$\vec{v} = \begin{bmatrix} 3 \\ 1 \\ 4 \end{bmatrix} \in \mathbb{R}^3$$

\mathbb{R}^n : The set of all n-element vectors with real numbered entries (i.e. n-space of $n \times 1$ vectors)

(a) Are the following vectors in \mathbb{R}^2 ?

i. $\begin{bmatrix} 3 \\ 6 \end{bmatrix}$

ii. $\begin{bmatrix} 5 \\ 0 \end{bmatrix}$

(b) Graphically show the vectors:

i. $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$

ii. $\begin{bmatrix} 5 \\ 2 \end{bmatrix}$

(c) Graphically show the vector sum and check your answer algebraically:

$$\begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 4 \\ 3 \end{bmatrix}$$