



# Lecture Notes

Linear Algebra

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# Chapter 1

## Lecture 1: Vector

### 1.1 Vector & Linear Combinations

#### 1.1.1 Linear Combination

$$cv + dw = c \begin{bmatrix} 1 \\ 1 \end{bmatrix} + d \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} c + 2d \\ c + 3d \end{bmatrix}$$

#### 1.1.2 Column Vector

$$v = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$$

Where  $v_1$  is the first component of  $v$ .

Where  $v_2$  is the second component of  $v$ .

# Chapter 2

## Lecture 2: Vector (cont.)

### 2.1 Matrices

**Matrices** are combinations of **Vectors**

$$u = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$v = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$$

$A$  is a 3 by 2 **matrix**:  $m = 3$  rows and  $n = 2$  columns

Suppose  $A$  is a system which input  $x$  and output  $b$

# Chapter 3

## Lecture 3: Elimination

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

