

# Linear Algebra

## [KOMS119602] - 2022/2023

### 12.4 - Intuition

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# Learning objectives

- To have an intuition of the concept of linear transformation.

# Vectors transformation (1)

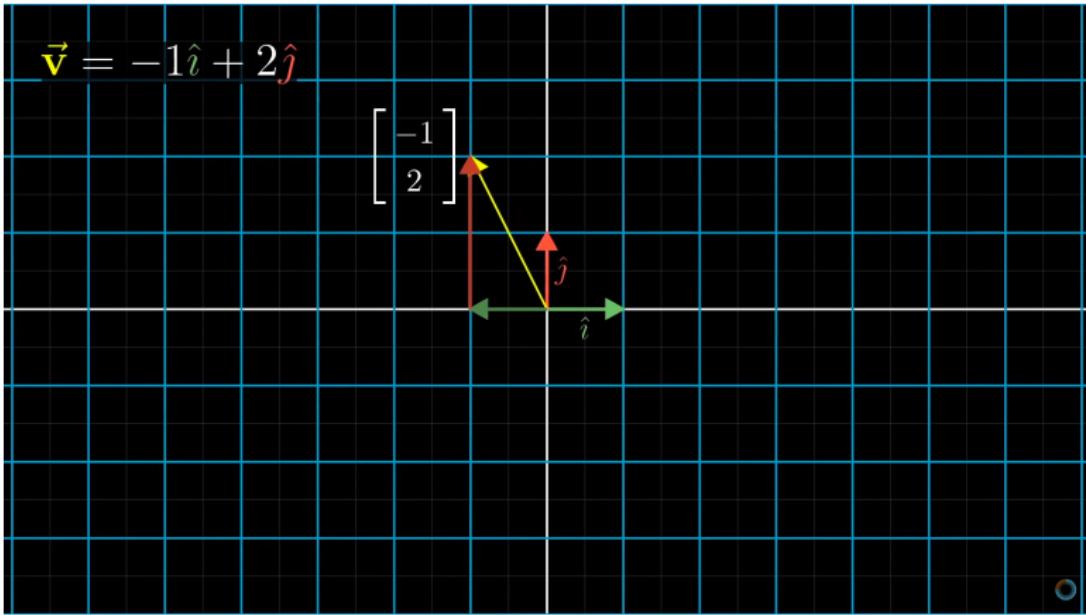


Figure: Source: *Youtube of 3Blue1Brown*

## Vectors transformation (2)

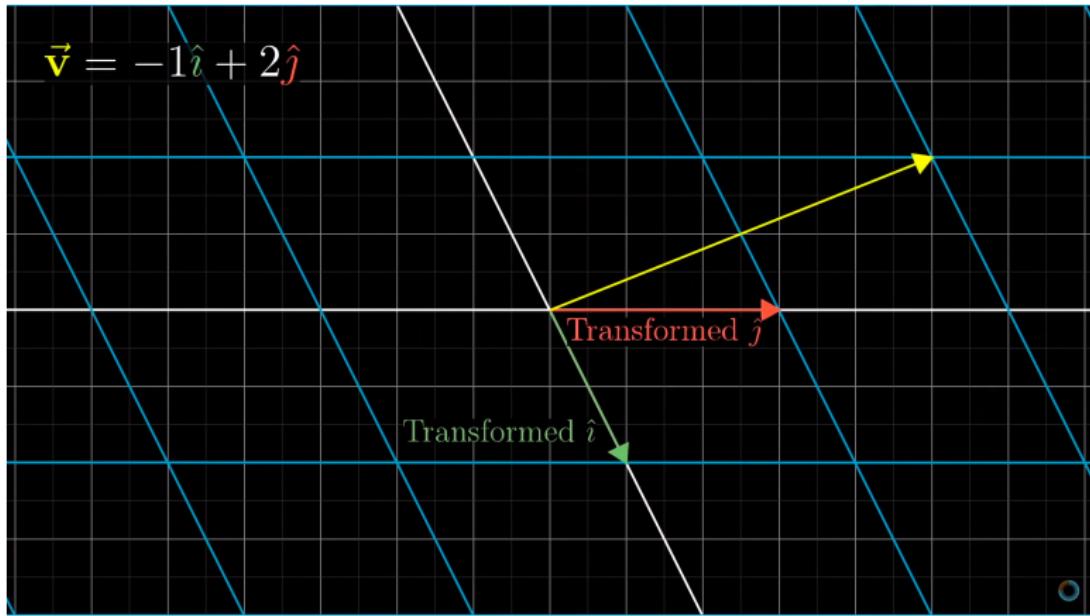


Figure: Source: Youtube of 3Blue1Brown

## Vectors transformation (3)

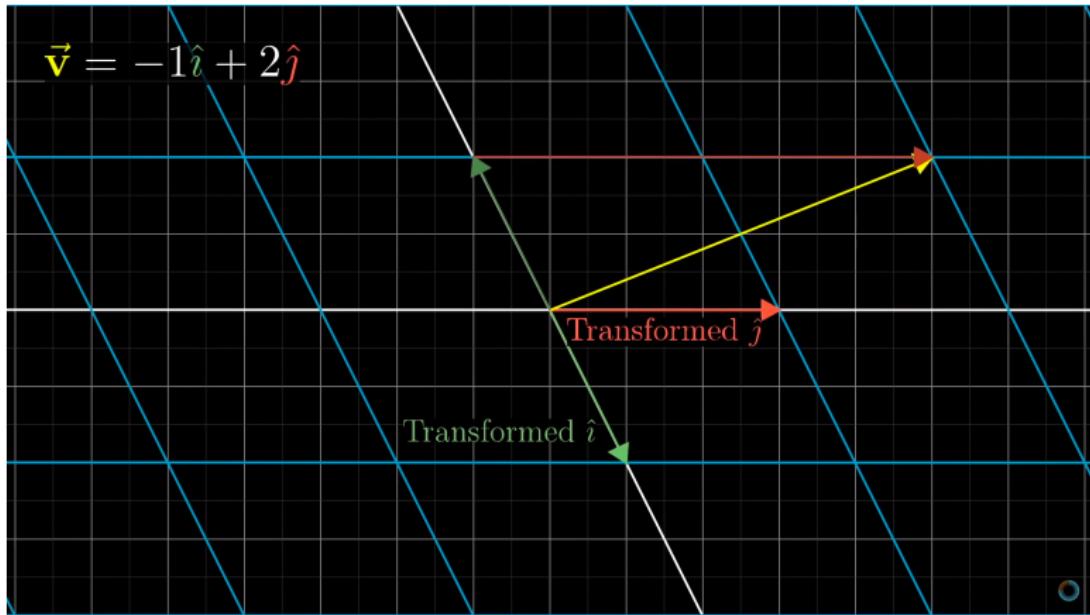


Figure: Source: Youtube of 3Blue1Brown

## Vectors transformation (4)

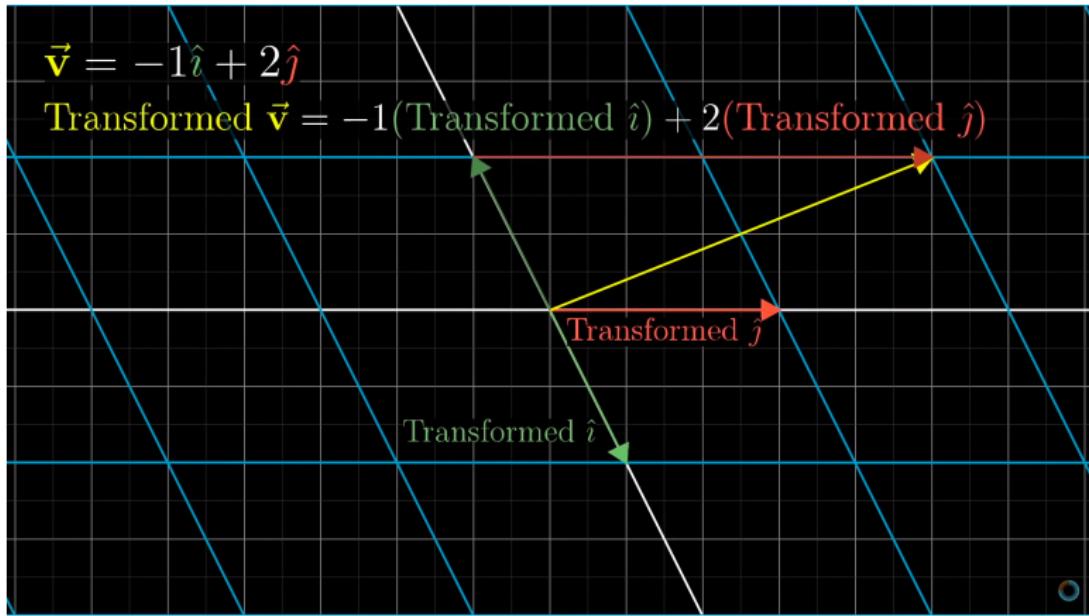


Figure: Source: Youtube of 3Blue1Brown

## Vectors transformation (5)

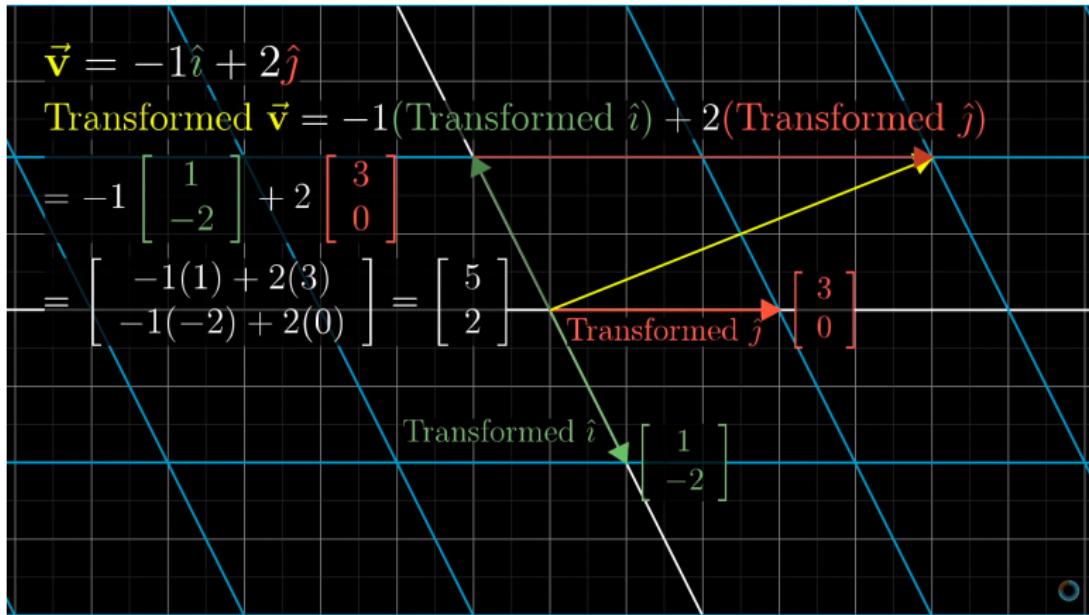


Figure: Source: Youtube of 3Blue1Brown

# Rule of transformation (1)

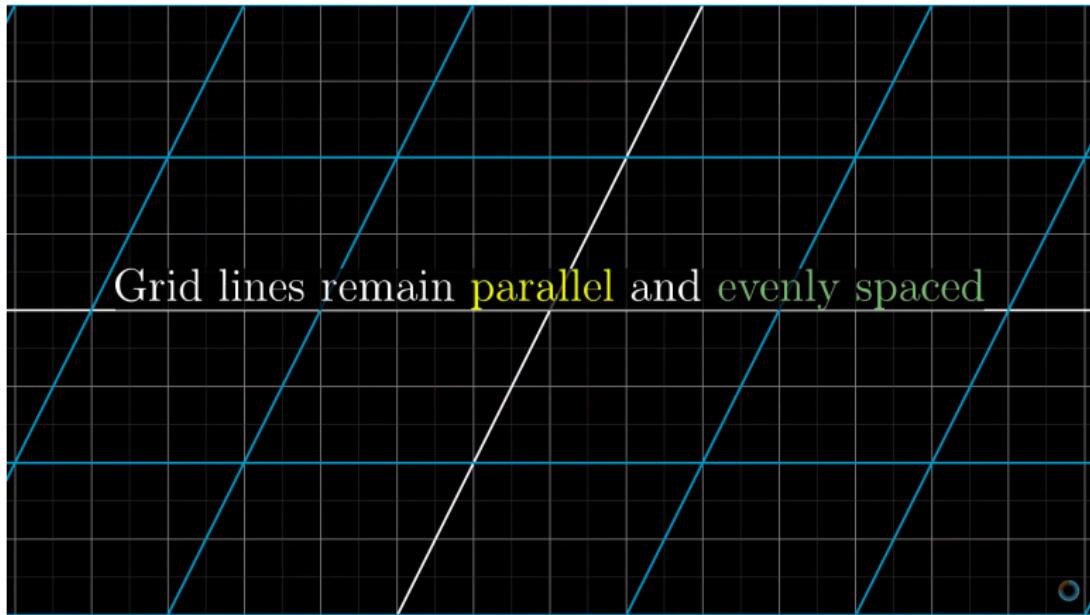


Figure: Source: *Youtube of 3Blue1Brown*

## Rule of transformation (2)

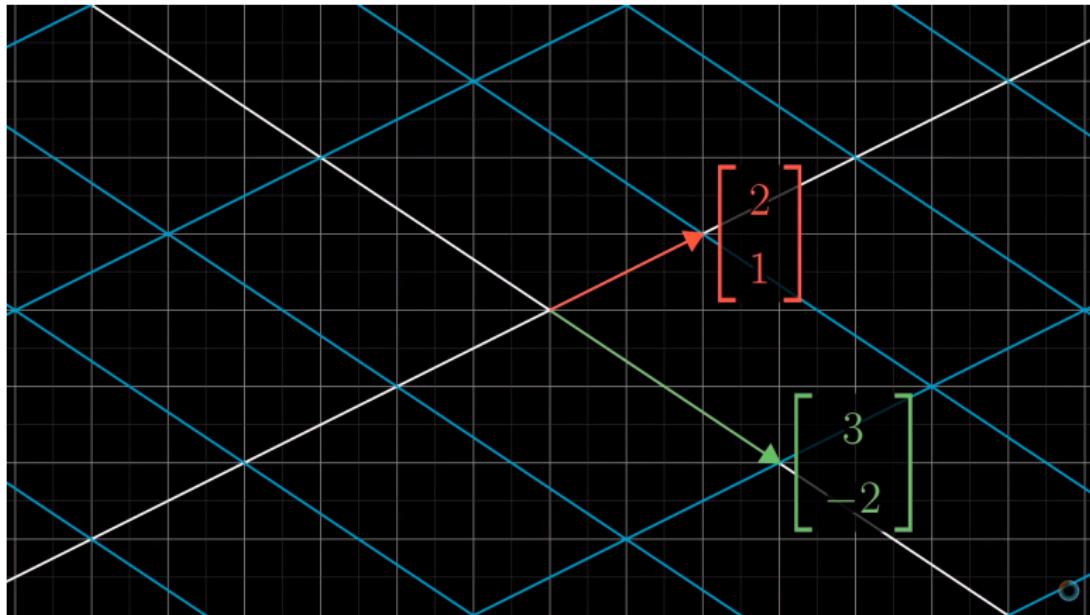


Figure: Source: *Youtube of 3Blue1Brown*

## Rule of transformation (3)

“2x2 Matrix”

$$\begin{bmatrix} \begin{pmatrix} 3 \\ -2 \end{pmatrix} & \begin{pmatrix} 2 \\ 1 \end{pmatrix} \end{bmatrix}$$

Where  $\hat{i}$  lands   Where  $\hat{j}$  lands



Figure: Source: Youtube of 3Blue1Brown

## Rule of transformation (4)

“2x2 Matrix”

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = x \underbrace{\begin{bmatrix} a \\ c \end{bmatrix}}_{\text{Where all the intuition is}} + y \underbrace{\begin{bmatrix} b \\ d \end{bmatrix}}_{\text{is}} = \begin{bmatrix} ax + by \\ cx + dy \end{bmatrix}$$

Where all the intuition is

Figure: Source: Youtube of 3Blue1Brown

# Example of transformation (1)

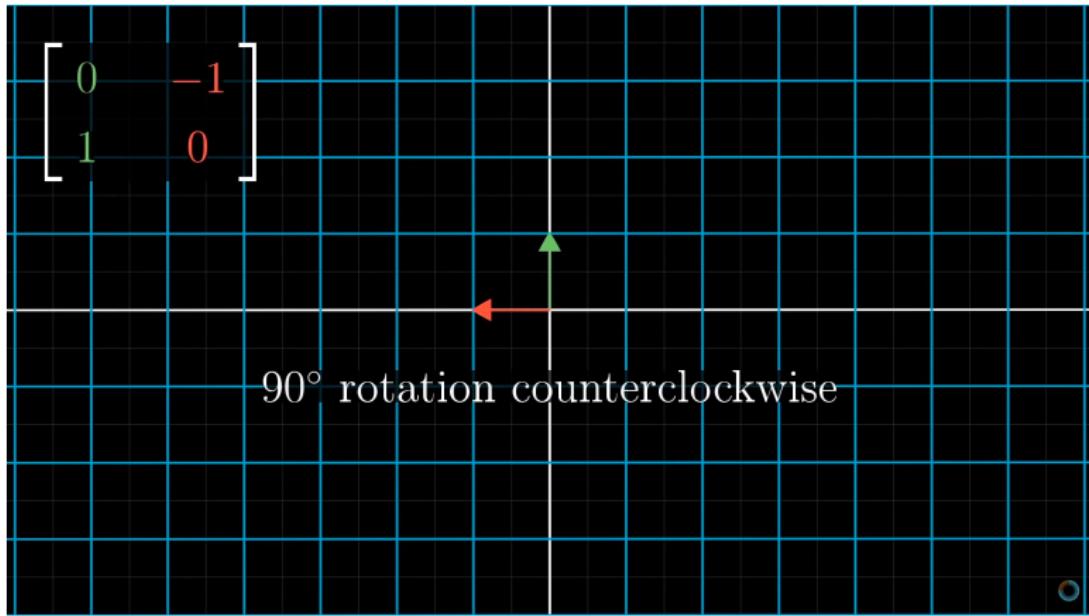


Figure: Source: *Youtube of 3Blue1Brown*

## Example of transformation (2)

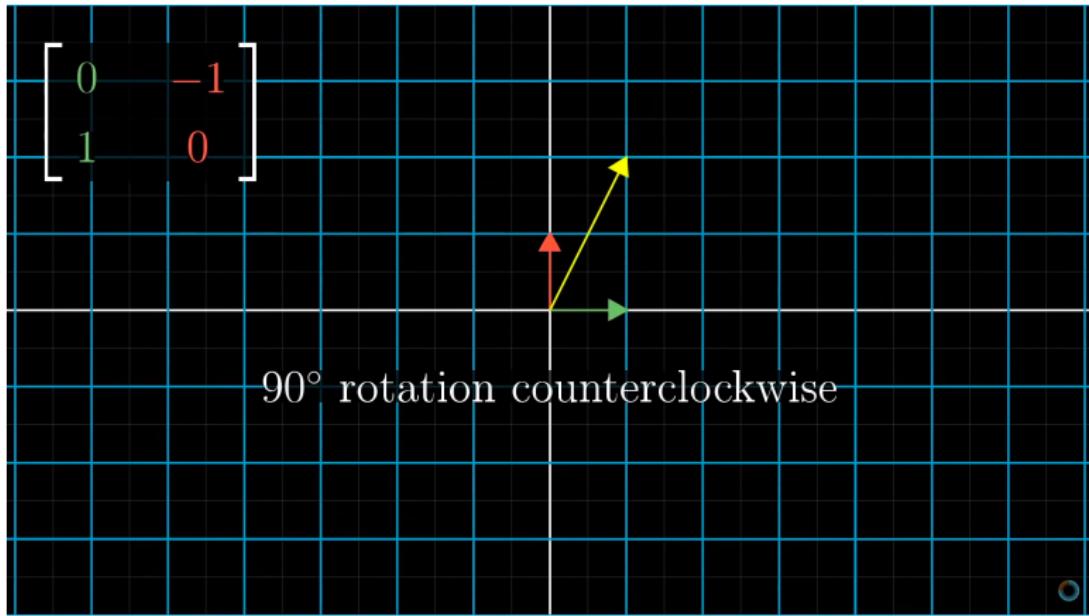


Figure: Source: *Youtube of 3Blue1Brown*

## Example of transformation (3)

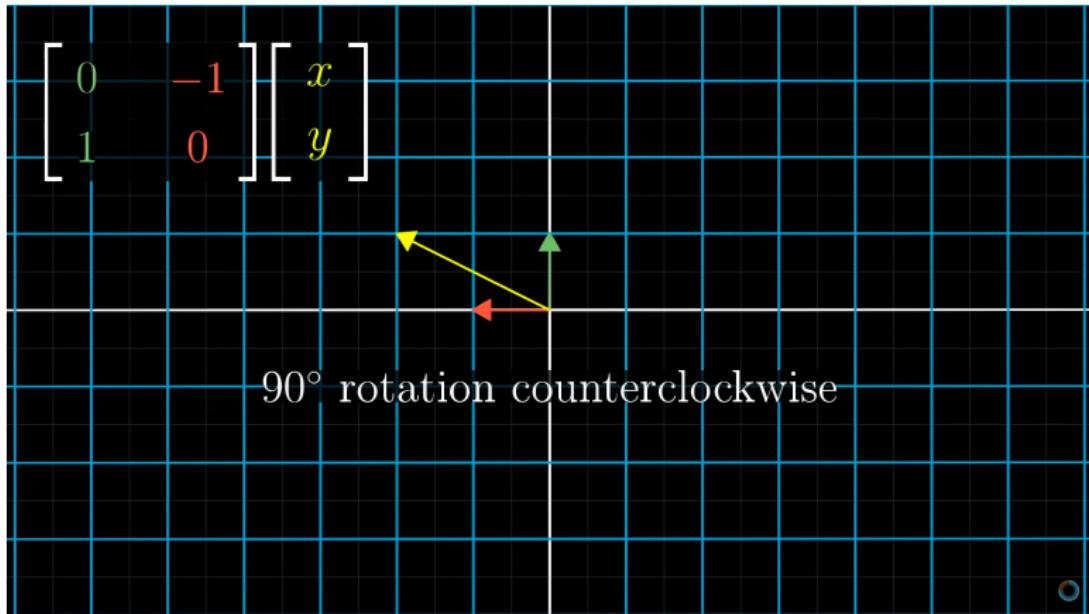


Figure: Source: Youtube of 3Blue1Brown

## Example of transformation (4)

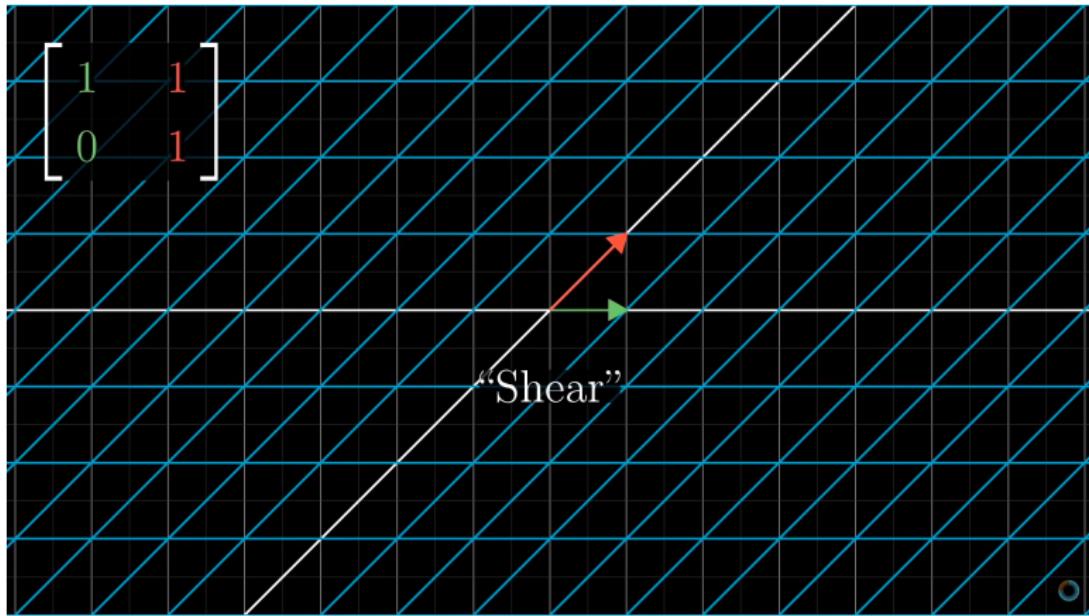


Figure: Source: Youtube of 3Blue1Brown

## Example of transformation (5)

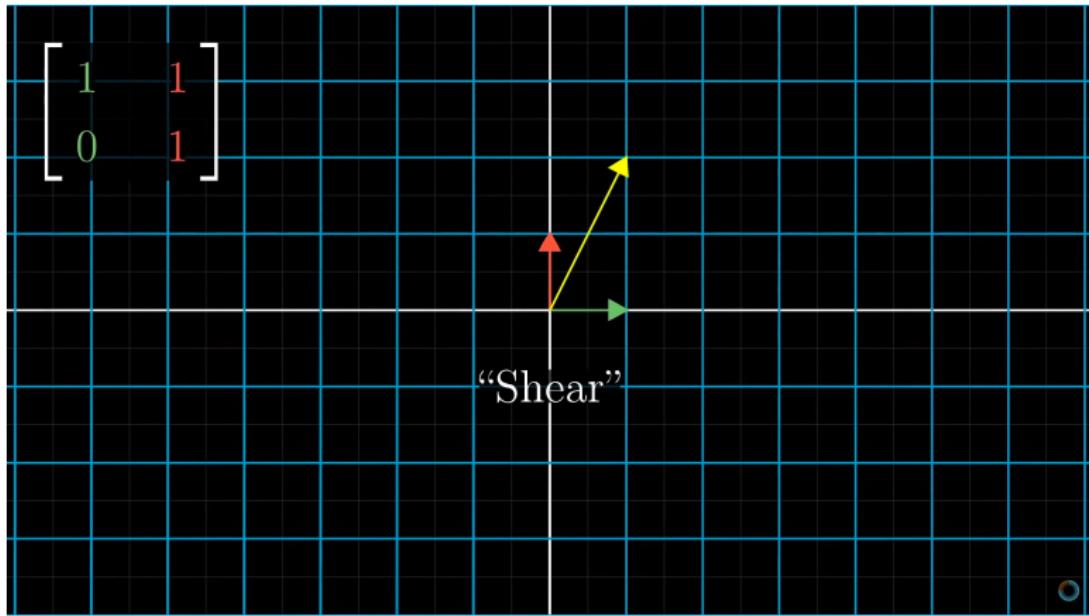


Figure: Source: *Youtube of 3Blue1Brown*

## Example of transformation (6)

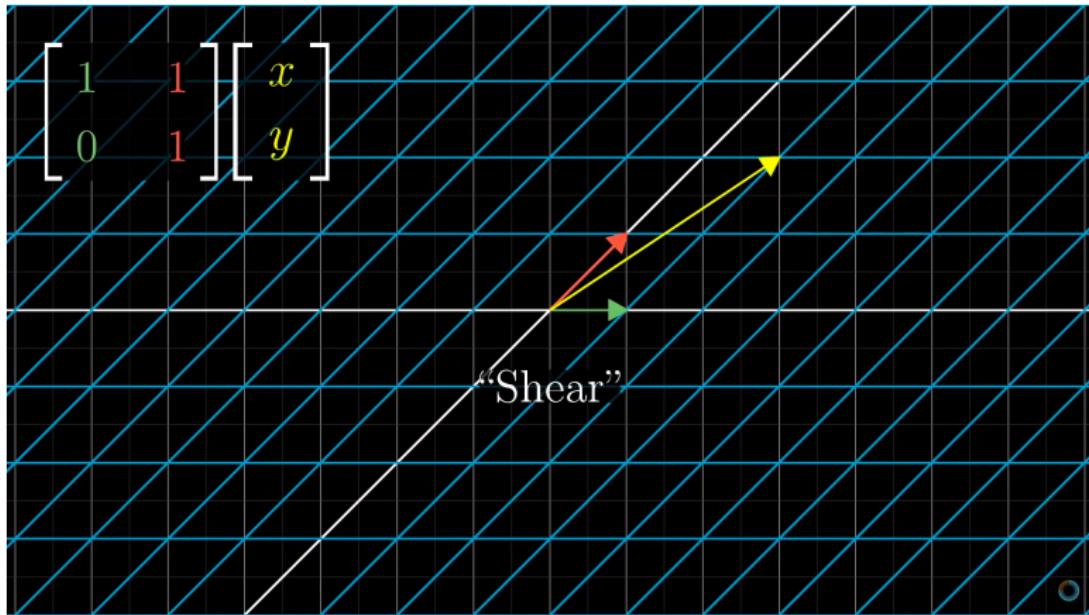


Figure: Source: Youtube of 3Blue1Brown