Matrices

26 June 2025 20:12

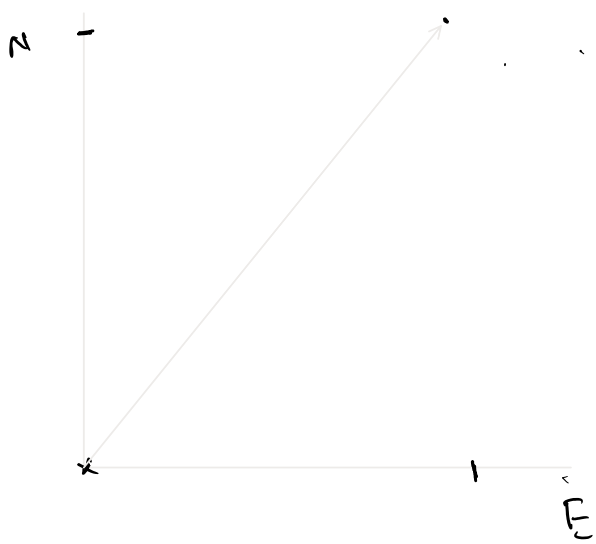
↳ Combination of rows and column.

functions → $Y = x^2$ ← x

Y ←

vectors → [– – – –]

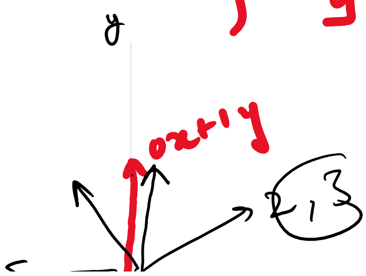
5E, 10N

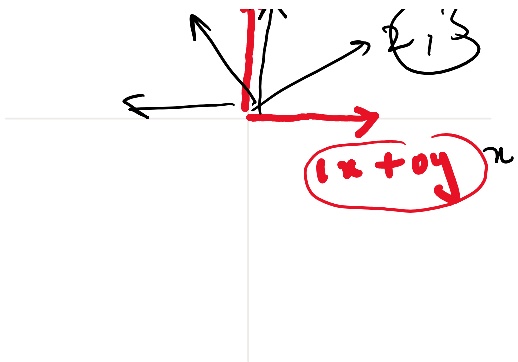


$Y = x^2$ ←

4.67, 5.98

90° anticlockwise





$x \rightarrow y$

$y \rightarrow -x$

x:

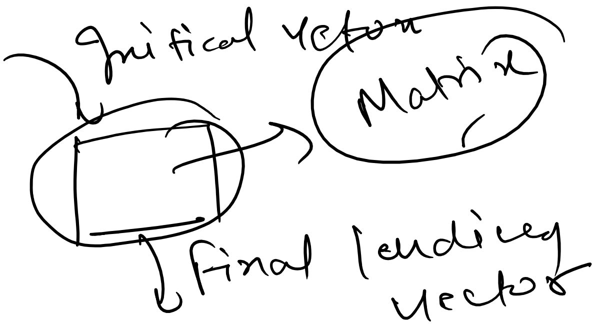
$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \xrightarrow{\text{Transformation}} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

y:

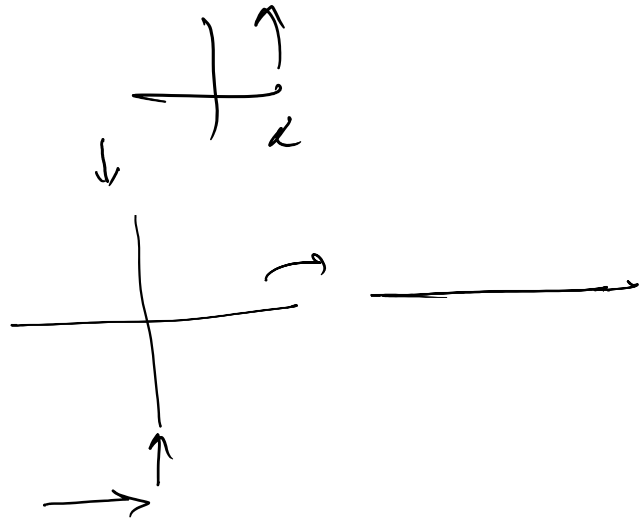
$$\begin{bmatrix} 0 \\ 1 \end{bmatrix} \xrightarrow{\text{Transformation}} \begin{bmatrix} -1 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

After transformation it is difficult to find the landing vector of any vector on cordinate system.

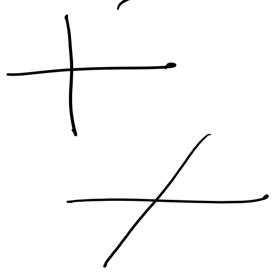


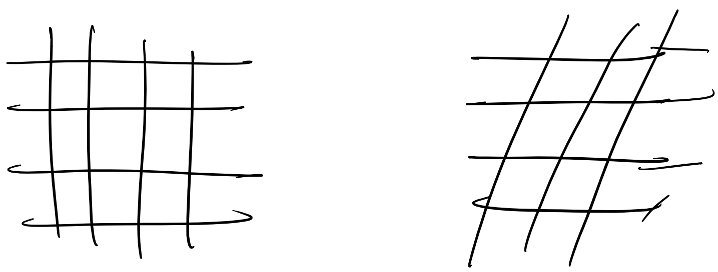
Rotation



Compress

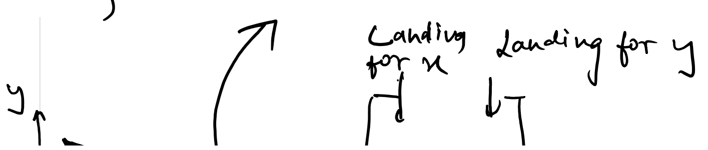
Skew



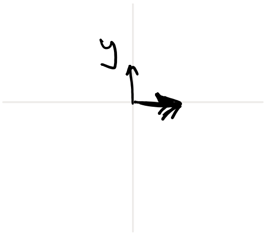


Maths:

90° anticlockwise



for x' axis



$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

$\vec{x}$

$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

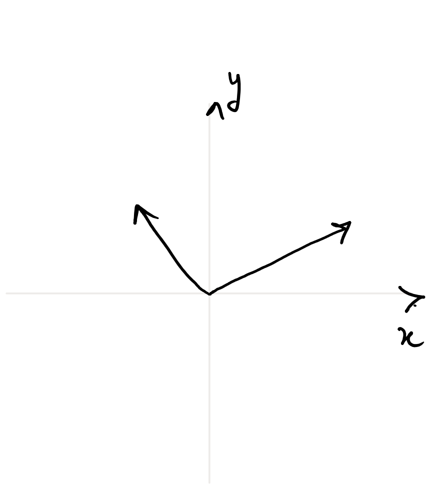
$A\vec{x}$ = final vector

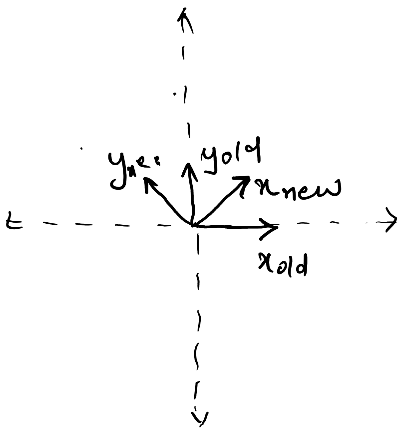
$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

2.7

3.5

$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 2.7 \\ 3.5 \end{bmatrix} = \begin{bmatrix} \ \end{bmatrix}$$



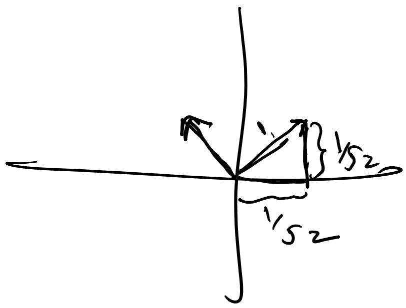


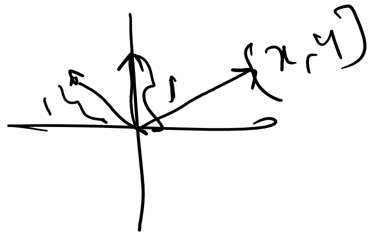
x_{old} $\qquad$ x_{new}

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \qquad \begin{bmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$$

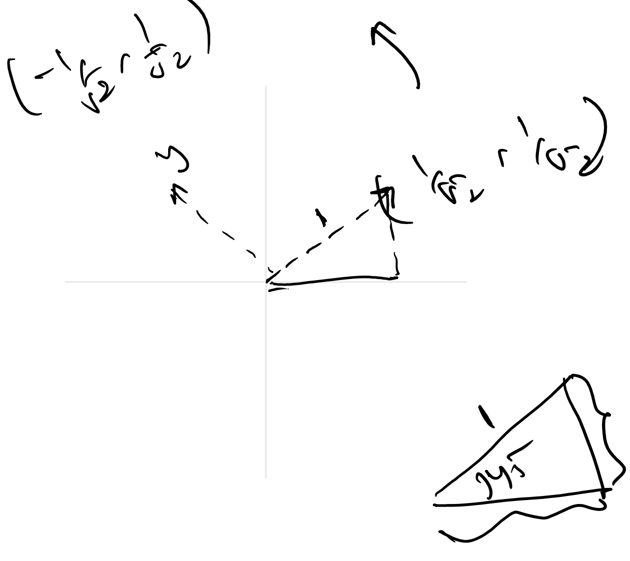
y_{old} $\qquad$ y_{new}

$$\begin{bmatrix} 0 \\ 1 \end{bmatrix} \qquad \begin{bmatrix} -1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$$





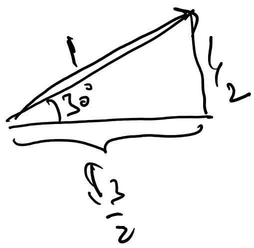
45° acw

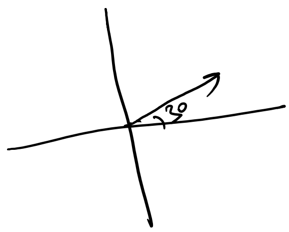


$$x \longrightarrow \begin{bmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$$

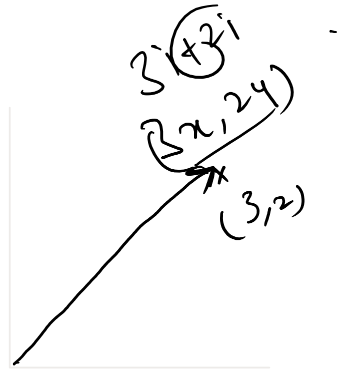
$$y \longrightarrow \begin{bmatrix} -1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$$

$$\begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \; \end{bmatrix}$$

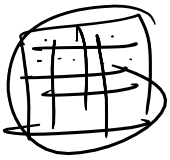


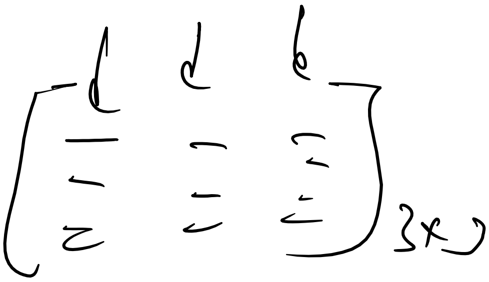


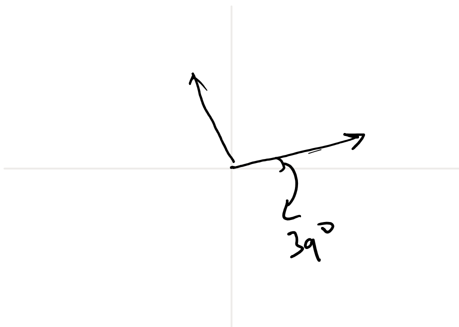
$$\begin{bmatrix} \sqrt{3}/2 \\ 1/2 \end{bmatrix}$$

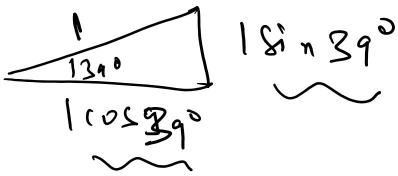


Matrix Algebra









Matrix Algebra:

Addition of Matrices

$$\begin{bmatrix} 1 & 4 \\ 3 & 6 \end{bmatrix} + \begin{bmatrix} 2 & 10 \\ 9 & 4 \end{bmatrix}$$

$$\begin{pmatrix} [illegible] & 4 \\ 3 & 6 \end{pmatrix} + \begin{pmatrix} [illegible] & 10 \\ 9 & 4 \end{pmatrix}$$

$$= \begin{bmatrix} 3 & 14 \\ 12 & 10 \end{bmatrix}$$

Subtraction of Matrices:

$$\begin{bmatrix} 4 & 6 \\ 10 & 12 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ 3 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 5 \\ 7 & 3 \end{bmatrix}$$

Multiplicatio

Multiplication of Matrices:

$$\begin{bmatrix} 2 & 3 \\ 4 & 6 \end{bmatrix}_{2\times 2} \qquad \begin{bmatrix} 1 & 4 \\ 1 & 2 \end{bmatrix}_{2\times 2}$$

$3 \times 4 \quad 3 \times 6 \quad$ ✗

$3 \times 4 \quad 4 \times 10 \quad$ ✓

$2 \times 3 \quad 3 \times 99 \rightarrow 2 \times 99$

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

$3 \times 1 + 4 \times 2 = 11$

$3 \times 3 + 4 \times 6 = 33$

$2 \times 1 + 1 \times 2 = 4$

$2 \times 3 + 1 \times 6 = 12$

$$\begin{bmatrix} 11 & 33 \\ 4 & 12 \end{bmatrix} \quad 2 \times 2$$

$$A = \begin{bmatrix} 10 & 20 \\ \end{bmatrix}$$

$$A = \begin{bmatrix} 10 & 20 \\ 5 & 15 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 4 \\ 6 & 2 \end{bmatrix}$$

$$A \times B = \begin{bmatrix} 10 & 20 \\ 5 & 15 \end{bmatrix} \begin{bmatrix} 1 \\ 6 \end{bmatrix} \begin{bmatrix} 4 \\ 2 \end{bmatrix}$$

$$= \begin{bmatrix} 130 & 80 \\ 95 & 50 \end{bmatrix}$$

$10 \times 1 + 20 \times 6$

$10 \times 4 + 20 \times 2$

$5 \times 1 + 15 \times 6$

$= 95$

$5 \times 4 + 15 \times 2$

50

$$\begin{bmatrix} 1 & 4 \\ 9 & 6 \end{bmatrix}$$

2×2

$$\begin{bmatrix} 4 & 6 \\ 9 & 1 \\ 10 & 11 \end{bmatrix}$$

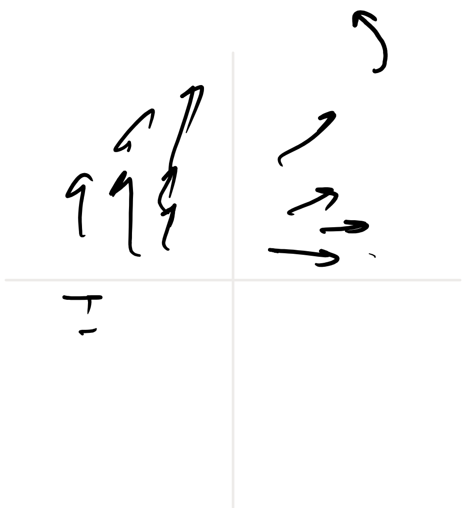
3×2

$$\begin{bmatrix} 1 & 4 \\ 9 & 6 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 4 \\ 9 & 6 \end{bmatrix}$$

Identity matrix

Eigen value and Eigen vector:

- PCA (Principle component Analysis
- SVD (Sigular value decomposition)



$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \to \begin{bmatrix} 3 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$$

Eigen vector: It is simply a vector which doesnot change its direction on a transformation

3 blue 1 Brown

Serrano academy
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