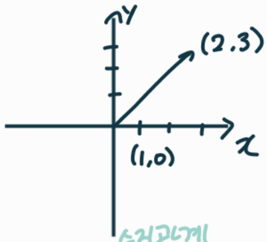
벡터 (크기, 방향) → 공간의 한점
스칼라 (크기)



(2,3)
(3,2,5)
(2,0) (0,1)

수직관계
2(1,0)+3(0,1)=(2,3)
선형 결합 (liner combination)

선형대수

내적

dot product
벡터 점 곱

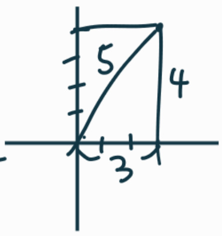
$\vec{a}=(1,0)$
$\vec{b}=(0,1)$

$\vec{a}\cdot\vec{b}$
(1,0) (0,1)
$=1\times0+0\times1=0$ → 수직
내적은 곱해서 0이면

$\vec{a}=(a_1, a_2)$
$\vec{b}=(a_2\cdot b_2)$
$\vec{a}\cdot\vec{b}=a_1a_2+a_2+b_2$

$\vec{a}=(a_1, a_2, a_3)$
$\vec{c}=(c_1, c_2, c_3)$
$\vec{a}\cdot\vec{c}=a_1c_1+a_2c_2+a_3c_3$
요소1개이므로 스칼라

$\vec{a}=(3,4)$
$(\vec{a})$= 크기는? 5임



$\sqrt{3^2+4^2}$

$\vec{a}=(4,7)$
$(\vec{a})$= 크기는?
$\sqrt{(4-0)^2+(7-0)^2}$

크기?
(5,6)
선분 직선
(2,4)

$\sqrt{(5-2)^2-(6-4)^2}$

$\sqrt{4+16}-\sqrt{25+36}+4$
$=\sqrt{13}$

$\vec{a} \cdot \vec{b} = (a_1, b_1) \cdot (a_2, b_2) = a_1a_2 + b_1b_2$

$= |\vec{a}| \cdot |\vec{b}| \cdot \cos\theta$

$\vec{a} \cdot \vec{b}$가 이루는 각 θ

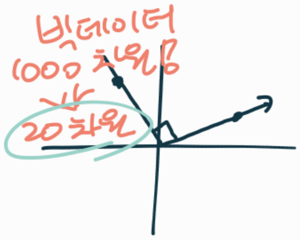
: 수직

: 직선

$\cos 90° = 0$

$\vec{a} = (-1, 2)$

$\vec{b} = (2, 1)$



$2x + y = 5$ —①

$x - y = 3$ —②

$3^{-1} = \frac{1}{3}$

(x, y) 값 구하기

$3x = 8$

$x = \frac{8}{3}$

$\frac{8}{3} - y = 3$

$y = \frac{8}{3} - 3 = -\frac{1}{3}$

$x = \left(-\frac{1}{3}, \frac{8}{3}\right)$ x 벡터를 찾은 것!

벡터를 곱하고 더하는 것 = 내적

$$\begin{pmatrix} 2 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$$

행렬 A x b

$$\begin{pmatrix} 2 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = 5$$

열벡터 $X = \begin{pmatrix} x \\ y \end{pmatrix}$ 열벡터 $b = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$

$AB = I$

$B = A^{-1}$

$AB = BA = I$

$A = B^{-1}$

$$x\begin{pmatrix} 2 \\ 1 \end{pmatrix} + y\begin{pmatrix} 1 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$$

$-\frac{1}{3} =$ $\frac{8}{3} =$

$-\frac{1}{3} \times 2 + \frac{8}{3} = 5$ $-\frac{1}{3} \times 1 + \frac{8}{3} \times (-1) = 3$

$2x+y-2z=3$ — ①
$4x+2y-5z=7$ — ②
$x-y+6z=4$ — ③

$x=\begin{pmatrix}x\\y\\z\end{pmatrix}$

$$\begin{pmatrix}2&1&-2\\4&2&-5\\1&-1&6\end{pmatrix}\begin{pmatrix}x\\y\\z\end{pmatrix}=\begin{pmatrix}3\\7\\4\end{pmatrix}$$

$7x+2y+z=14$

①+③ $3x+4z=7$ $\quad 3x-4=7$ $\quad 3x=11$ $\quad x=\frac{11}{3}$

2①−② $4x+2y-4z=6$
$\quad 4x+2y-5z=7$
$\quad z=-1$

③ $\frac{11}{3}-y+6\times-1=4$ $\qquad x=\begin{pmatrix}\frac{11}{3}\\-\frac{19}{3}\\-1\end{pmatrix}$

$y=-6-4+\frac{11}{3}=\frac{17}{3}$

검증)

$$\begin{pmatrix}2&1&-2\\4&2&-5\\1&-1&6\end{pmatrix}\begin{pmatrix}x\\y\\z\end{pmatrix}=\begin{pmatrix}3\\7\\4\end{pmatrix}$$

$Ax=b$
$x=A^{-1}b$

$$\overset{\frac{11}{3}}{x}\begin{pmatrix}2\\4\\1\end{pmatrix}+\overset{\frac{17}{3}}{y}\begin{pmatrix}1\\2\\-1\end{pmatrix}+\overset{-1}{z}\begin{pmatrix}-2\\-5\\-6\end{pmatrix}=\begin{pmatrix}3\\7\\4\end{pmatrix}$$ 대입

$\frac{11}{3}\times2-\frac{19}{3}+2=3$

$\frac{22-19+6}{3}=\frac{9}{3}=3$