C2-001_Practice 01

Date	@2022년 8월 1일 오전 9:30
Lecture Note	C2-001_Lecture_01-vectors.pdf
Practice (pdf)	
Topics	Lecture 01: Vectors
Week	1

- Please mark what you think is correct answer (O or X) and show why you choose it

1. Given a set of vectors, $V = \left\{ \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \right\}$, these vectors are linearly independent.

2. We can represent a point, $\mathbf{x} = (x_1, x_2, x_3)$ in $\mathbb{R}^3$ using these vectors, $\mathbf{a} = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$, $\mathbf{b} = \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}$, and $\mathbf{c} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$.

3. $Span \left(\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \right)$ is equal to $\mathbb{R}^3$, i.e., $Span \left(\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \right) = \mathbb{R}^3$.

4. Given a set of vectors, $V = \left\{ \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \right\}$, these vectors are linearly dependent.

5. We can represent a point, $\mathbf{x} = (x_1, x_2, x_3)$ in $\mathbb{R}^3$ using these vectors, $\mathbf{a} = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$, $\mathbf{b} = \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}$, and $\mathbf{c} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$.

6. $Span\left(\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}\right)$ is equal to $\mathbb{R}^2$, i.e., $Span\left(\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}\right) = \mathbb{R}^2$.

7. The line equation passing through two vectors, $\mathbf{a} = \begin{bmatrix} 3 \\ 3 \\ 2 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 1 \\ 7 \\ 3 \end{bmatrix}$, is $x = 3 + t, y = 3 + 7t, z = 2 + 3t$.

8. Distance from $\mathbf{Q} = (2, 3, 1)$ to the plane containing the point $\mathbf{P}_0 = \begin{bmatrix} 3 \\ 3 \\ 2 \end{bmatrix}$ and its normal vector $\mathbf{n} = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ is $\frac{-3}{\sqrt{14}}$.

9. If the distance between the plane $x - By + z = D$ and the plane containing the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{4} = \frac{y-3}{5} = \frac{z-2}{6}$ is $\sqrt{5}$, then B is 2 and $|D|$ is 5.

10. A given linear system $\begin{cases} x_1 + 2x_2 + 2x_3 + x_4 = 2 \\ 2x_1 + 4x_2 + 6x_3 + 4x_4 = -6 \\ x_1 + 2x_2 - x_4 = -8 \end{cases}$ has no solution.