

202010819 조정현 13주차 과제

[연습문제 8.1 part 3]

#2 (1) (2) $\sqrt{2}$

(1) $\vec{u} = (1, 0)$ $\vec{v} = (1, 1)$
 $\vec{u} - \vec{v} = (1, 0) - (1, 1)$
 $= (0, -1)$

$\|\vec{u} - \vec{v}\| = \sqrt{0+1} = 1$

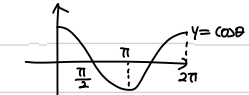
(2) $\vec{u} = (0, 0)$ $\vec{v} = (1, -1)$
 $\vec{u} - \vec{v} = (-1, 1)$
 $\|\vec{u} - \vec{v}\| = \sqrt{1+1} = \sqrt{2}$

#3) 12

$u \cdot v = 2 \times 4 + 3 \times 2 + 2 \times (-1)$
 $= 8 + 6 - 2 = 12$

#5) 90°

$u \cdot v = 0 = \|\vec{u}\| \|\vec{v}\| \cos \theta$
 $\cos \theta = 0$ 이므로 u 와 v 가 이루는 각은 90° 이다.



#6) $x = \frac{1}{10}, y = \frac{-2}{15}$

두 벡터가 직교하면 두 벡터의 내적 = 0 이어야함
 $\vec{w} \cdot \vec{u} = 0$ 이고 $\vec{w} \cdot \vec{v} = 0$ 이어야 함.
 $\therefore \vec{w} \cdot \vec{u} = 4x + 3y = 0$
 $\vec{w} \cdot \vec{v} = -2x + 1 + 6y = 0$

$3y = -4x$ $-2x + 1 - 6x = 0$
 $y = \frac{-4}{3}x$ $-8x = -1$
 $x = \frac{1}{8}$
 $y = \frac{-4}{3} \times \frac{1}{8} = \frac{-1}{6}$

#7) $\cos \theta = \frac{-23}{3\sqrt{170}}$, $\frac{5\pi}{7}$

$\vec{u} \cdot \vec{v} = 2 - 9 - 20 + 4$
 $= -23$
 $= \|\vec{u}\| \|\vec{v}\| \cos \theta$

$\|\vec{u}\| = \sqrt{1+9+25+16}$
 $= \sqrt{51}$

$\|\vec{v}\| = \sqrt{4+9+16+1}$
 $= \sqrt{30}$

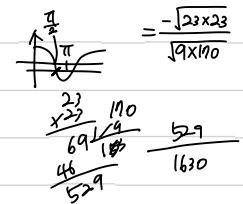
$\sqrt{51} \sqrt{30} \cos \theta = -23$

$\sqrt{2 \times 10 \times 3 \times 10} \cos \theta = -23$

$3\sqrt{170} \cos \theta = -23$

$\cos \theta = \frac{-23}{3\sqrt{170}}$

$= \frac{-23 \times 23}{\sqrt{9 \times 170}}$



[연습문제 8.2 part 3]

#2) (1) $5i + 7j + 3k$ (2) $-5i - 7j - 3k$

(1) $\begin{vmatrix} i & j & k \\ 1 & -2 & 3 \\ 2 & -1 & -1 \end{vmatrix}$
 $= i \begin{vmatrix} -2 & 3 \\ -1 & -1 \end{vmatrix} - j \begin{vmatrix} 1 & 3 \\ 2 & -1 \end{vmatrix} + k \begin{vmatrix} 1 & -2 \\ 2 & -1 \end{vmatrix}$
 $= i(2+3) - j(-1-6) + k(-1+4)$
 $= 5i + 7j + 3k$

(2) $\begin{vmatrix} i & j & k \\ 2 & -1 & -1 \\ 1 & -2 & 3 \end{vmatrix} = i \begin{vmatrix} -1 & -1 \\ -2 & 3 \end{vmatrix} - j \begin{vmatrix} 2 & -1 \\ 1 & 3 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 1 & -2 \end{vmatrix}$
 $= i(-3-2) - j(6+1) + k(-4+1)$

#4) $\sqrt{62}$

$$\begin{vmatrix} i & j & k \\ 2 & -1 & 1 \\ 1 & 3 & -1 \end{vmatrix}$$

$$= i \begin{vmatrix} -1 & 1 \\ 3 & -1 \end{vmatrix} - j \begin{vmatrix} 2 & 1 \\ 1 & -1 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 1 & 3 \end{vmatrix}$$

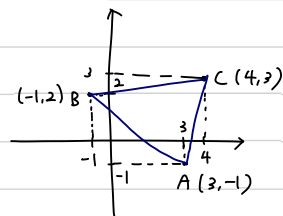
$$= i(1-3) - j(-2-1) + k(6+1)$$

$$= -2i + 3j + 7k$$

$$\therefore \sqrt{4+9+49} = \sqrt{62}$$

$$= \sqrt{62}$$

$$\begin{array}{r} 49 \\ +13 \\ \hline 62 \end{array}$$

#6) $\frac{19}{2}$ 

$$4 \times 5 - 3 \times 4 \times \frac{1}{2} - 1 \times 4 \times \frac{1}{2} - 5 \times 1 \times \frac{1}{2}$$

$$= 20 - 6 - 2 - \frac{5}{2}$$

$$= 12 - \frac{5}{2} = \frac{24-5}{2} = \frac{19}{2}$$

#9) (1) 18 (2) 0

$$(1) \begin{vmatrix} 1 & 2 & -3 \\ 3 & 4 & -1 \\ 2 & -1 & 5 \end{vmatrix} = 1 \cdot \begin{vmatrix} 4 & -1 \\ -1 & 5 \end{vmatrix} - 2 \begin{vmatrix} 3 & -1 \\ 2 & 5 \end{vmatrix} - 3 \begin{vmatrix} 3 & 4 \\ 2 & -1 \end{vmatrix}$$

$$= 20 - 1 - 2(15 + 2) - 3(-3 - 8)$$

$$= 20 - 1 - 34 + 33$$

$$= 20 - 2 = 18$$

$$(2) \begin{vmatrix} 1 & 1 & 3 \\ 1 & -2 & -4 \\ 4 & 1 & 5 \end{vmatrix}$$

$$= 1 \begin{vmatrix} -2 & -4 \\ 1 & 5 \end{vmatrix} - 1 \begin{vmatrix} 1 & -4 \\ 4 & 5 \end{vmatrix} + 3 \begin{vmatrix} 1 & -2 \\ 4 & 1 \end{vmatrix}$$

$$= 1 \cdot (-10 + 4) - 1 \cdot (5 + 16) + 3(1 + 8)$$

$$= -6 - 21 + 27$$

$$= 0$$