

CHAPTER 04

4.1

(a) $2\vec{a} - \vec{b} = \langle 4, 3, -4 \rangle$

(c) $2\vec{a} + \vec{b} - 2\vec{c} = \langle -2, 7, 0 \rangle$

(e) $\|\vec{a} - 2\vec{b} - 2\vec{c}\| = \sqrt{74}$

(b) $-\vec{a} - \vec{b} + 2\vec{c} = -\langle 4, -5, -3 \rangle$

(d) $\|\vec{a} - 2\vec{b}\| = \sqrt{5}$

(f) $\|-\vec{a} + \vec{b} - 2\vec{c}\| = \sqrt{146}$

4.2

(a) $\|\overrightarrow{p_1 p_2}\| = \sqrt{2}$

(c) $\|\overrightarrow{p_1 p_2}\| = \sqrt{3}$

(e) $\|\overrightarrow{p_1 p_2}\| = \sqrt{11}$

(b) $\|\overrightarrow{p_1 p_2}\| = 5$

(d) $\|\overrightarrow{p_1 p_2}\| = \sqrt{19}$

4.3

(a) $\vec{a} \cdot \vec{b} = 7$

(c) $\vec{a} \cdot \vec{b} = -9$

(e) $\vec{a} \cdot \vec{b} = 3$

(b) $\vec{a} \cdot \vec{b} = -2$

(d) $\vec{a} \cdot \vec{b} = 10$

(f) $\vec{a} \cdot \vec{b} = -2$

4.4

(a) $\theta = 60^\circ$

(c) $\theta = 90^\circ$

(e) $\theta = 81.8^\circ$

(b) $\theta = 90^\circ$

(d) $\theta = 24.1^\circ$

(f) $\theta = 90^\circ$

4.5

(a) $c = -2$

(c) $c = 5$

(b) $c = -2$

(d) $c = \frac{4}{5}$

4.6

(a) $W = -8 \text{ (N} \cdot \text{m)}$

(b) $W = 10 \text{ (N} \cdot \text{m)}$

(c) $W = -1 \text{ (N} \cdot \text{m)}$

4.7

$$(a) \alpha = \beta = \gamma = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right) \approx 0.9553 \approx 54.7^\circ$$

$$(b) \alpha = \cos^{-1}\left(\frac{2}{\sqrt{6}}\right) = 35.3^\circ, \quad \beta = \cos^{-1}\left(\frac{1}{\sqrt{6}}\right) = 65.9^\circ, \quad \gamma = \cos^{-1}\left(\frac{1}{\sqrt{6}}\right) = 65.9^\circ$$

$$(c) \alpha = \cos^{-1}\left(\frac{-2}{3}\right) = 131.8^\circ, \quad \beta = \cos^{-1}\left(\frac{-2}{3}\right) = 131.8^\circ, \quad \gamma = \cos^{-1}\left(\frac{1}{3}\right) = 70.5^\circ$$

$$(d) \alpha = \cos^{-1}\left(\frac{2}{\sqrt{17}}\right) = 61.0^\circ, \quad \beta = \cos^{-1}\left(\frac{-3}{\sqrt{17}}\right) = 136.7^\circ, \quad \gamma = \cos^{-1}\left(\frac{-2}{\sqrt{17}}\right) = 119.0^\circ$$

4.8

$$\alpha_S = \cos^{-1}\left(\frac{8}{\sqrt{180}}\right) = 53.4^\circ, \quad \beta_E = \cos^{-1}\left(\frac{10}{\sqrt{180}}\right) = 41.8^\circ, \quad \gamma_N = \cos^{-1}\left(\frac{4}{\sqrt{180}}\right) = 72.7^\circ$$

4.9

$$(a) \text{comp}_{\vec{b}} \vec{a} = \frac{4}{\sqrt{3}}$$

$$(c) \text{comp}_{\vec{b}} \vec{a} = \frac{8}{\sqrt{14}}$$

$$(b) \text{comp}_{\vec{b}} \vec{a} = \frac{-4}{\sqrt{5}}$$

$$(d) \text{comp}_{\vec{b}} \vec{a} = \frac{4}{\sqrt{11}}$$

4.10

$$(a) \text{proj}_{\vec{b}} \vec{a} = \left\langle -\frac{1}{3}, -\frac{1}{3}, \frac{2}{3} \right\rangle$$

$$(c) \text{proj}_{\vec{b}} \vec{a} = \left\langle -\frac{1}{2}, -\frac{1}{2}, 1 \right\rangle$$

$$(b) \text{proj}_{\vec{b}} \vec{a} = \left\langle \frac{14}{6}, -\frac{7}{6}, \frac{7}{6} \right\rangle$$

$$(d) \text{proj}_{\vec{b}} \vec{a} = \left\langle \frac{1}{3}, \frac{1}{3}, -\frac{2}{3} \right\rangle$$

4.11

$$(a) \text{proj}_{\vec{b}} \vec{a} = \left\langle \frac{8}{9}, \frac{16}{9}, \frac{-16}{9} \right\rangle$$

$$(c) \text{proj}_{(\vec{a}+\vec{b})} \vec{a} = \left\langle \frac{3}{2}, 2, -\frac{3}{2} \right\rangle$$

$$(b) \text{proj}_{\vec{b}^\perp} \vec{a} = \left\langle \frac{10}{9}, \frac{2}{9}, \frac{7}{9} \right\rangle$$

$$(d) \text{proj}_{(\vec{a}-\vec{b})} \vec{a} = \left\langle \frac{1}{2}, 0, \frac{1}{2} \right\rangle$$

4.12

$$(a) \vec{a} \times \vec{b} = 7\vec{k}$$

$$(c) \vec{a} \times \vec{b} = -8\vec{i} - 4\vec{j} - 2\vec{k}$$

$$(b) \vec{a} \times \vec{b} = \vec{k}$$

$$(d) \vec{a} \times \vec{b} = -6\vec{i} - 3\vec{k}$$

4.13

(a) $\theta = \sin^{-1}\left(\frac{6}{\sqrt{8} \cdot \sqrt{5}}\right) = 71.6^\circ$

(b) $\theta = \sin^{-1}(1) = 90^\circ$

(c) $\theta = \sin^{-1}\left(\frac{9}{\sqrt{18} \cdot \sqrt{5}}\right) = 71.6^\circ$

(d) $\theta = \sin^{-1}\left(\frac{3}{\sqrt{5} \cdot \sqrt{2}}\right) = 71.6^\circ$

4.14

(a) 7.176

(b) $\frac{3\sqrt{5}}{2}$

4.15

(a) $3\sqrt{5}$

(b) 26.3

(c) $\sqrt{142}$

4.16

$M = 1000(\text{N} \cdot \text{m})$

4.17

(a) 23

(b) 6

4.18

(a) 주어진 세 벡터는 동일한 평면상에 있지 않다.

(b) 주어진 세 벡터는 동일한 평면상에 있다.

4.19

(a) $\vec{i} - \vec{j} - 2\vec{k}$

(b) $\vec{i} - \vec{j} - 2\vec{k}$

4.20

- (a) 일차종속
- (b) 일차독립
- (c) 일차독립
- (d) 일차종속

4.21

- (a) $\vec{a} \cdot \vec{b} = -15$
- (b) $\vec{a} \cdot \vec{b} = 2$

4.22

- (a) 직교한다.
- (b) 직교한다.