TOPIC

Chapter 1

Vector Product

Exercise 1.47

a.) Magnitude & Direction of $\vec{A} \times \vec{D}$

$$\vec{A} \times \vec{D} = |\vec{A}|\,|\vec{D}| \sin\phi\ \hat{n} = (8m)(10m)\sin(127^\circ)\ \hat{n}$$

$$\vec{A} \times \vec{D} = 63.89\ \hat{n}$$

$\hat{n}$ = unit vector determined by the right-hand-rule (R.H.R)

$\hat{n}$ = $-z$ direction $= -\hat{k}$

$$\boxed{\vec{A} \times \vec{D} = -63.9\ \hat{k}}$$

b.) Magnitude of $\vec{D} \times \vec{A}$ (and direction)

$$\vec{D} \times \vec{A} = -\vec{A} \times \vec{D} = +63.9\ \hat{k} \qquad \boxed{\vec{D} \times \vec{A} = 63.9\ \hat{k}}$$

Exercise 1.80

a.) Let $\hat{k}$ be a vector that points in the direction from a→b.

Let $\vec{C} = \hat{\imath} + \hat{\jmath} + \hat{k}$ be a vector that points in the direction from a→d.

$$\cos\theta_{\hat{k},\vec{C}} = \frac{\vec{C} \cdot \hat{k}}{|\vec{C}|\,|\hat{k}|} = \frac{1}{\sqrt{3}\,(1)} \qquad \theta_{\hat{k},\vec{C}} = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

$$\boxed{\theta_{\hat{k},\vec{C}} = 54.7^\circ}$$

b.) Let $\vec{D} = \hat{\jmath} + \hat{k}$ be a vector that points in the direction from a→c

$$\cos\theta_{\vec{C},\vec{D}} = \frac{\vec{C} \cdot \vec{D}}{|\vec{C}|\,|\vec{D}|} = \frac{2}{\sqrt{3}\,\sqrt{2}} \qquad \theta_{\vec{C},\vec{D}} = \cos^{-1}\left(\frac{2}{\sqrt{6}}\right)$$

$$\boxed{\theta_{\vec{C},\vec{D}} = 35.26^\circ}$$