167:

Vector Projection:

$$\begin{aligned}\vec{u} &= \langle 5, 2\rangle \\ \vec{v} &= \langle 2, 3\rangle \\ \vec{w} &= \vec{\text{proj}}_{\vec{v}}\vec{u} \\ &= \frac{\vec{u}\cdot\vec{v}}{\|\vec{v}\|^2}\vec{v} \\ &= \frac{16}{13}\langle 2, 3\rangle \\ \vec{\text{proj}}_{\vec{v}}\vec{u} &= \frac{32}{13}\hat{\imath} + \frac{48}{13}\hat{\jmath}\end{aligned}$$

Scalar Projection:

$$\begin{aligned}\text{proj}_{\vec{v}}\vec{u} &= \|\vec{w}\| \\ &= \frac{16}{\sqrt{13}}\end{aligned}$$

175:

Given:

$$F = \langle 5, 6, -2\rangle$$
$$P(3, -1, 0), \quad Q(2, 3, 1)$$

$$\begin{aligned}W &= F \cdot \vec{PQ} \\ &= \langle 5, 6, -2\rangle \cdot \langle -1, -4, -1\rangle \\ &= -17 \\ W &= 17 \text{ N m}\end{aligned}$$

177:

Given:

$$\theta = 20°,\ ||F|| = 25, D = 50$$

$$\begin{aligned}W &= ||F|| \cdot D \cdot \cos\theta \\ &= 25 \cdot 50 \cdot \cos 20° \\ &= 25 \cdot 50 \cdot 0.9397 \\ &= 1174.25 \text{ ft lb} \\ &\approx 1175 \text{ ft lb}\end{aligned}$$

209:

Given:

$$u = \langle 3, 2, 0\rangle, \quad v = \langle 0, 2, 1\rangle$$

$$\begin{aligned}A &= ||\vec{u} \times \vec{v}|| \\ &= ||\langle 2, -3, 6\rangle|| \\ &= 7\end{aligned}$$

215:

Given:

$$u = \langle 1, 1, 1\rangle,\ v = \langle 7, 6, 9\rangle,\ w = \langle 4, 2, 7\rangle$$

$$\begin{aligned}\vec{v} \cdot (\vec{u} \times \vec{w}) &= \vec{v} \cdot \langle 5, -3, -2\rangle \\ &= -1 \\ \vec{w} \cdot (\vec{u} \times \vec{v}) &= \vec{w} \cdot \langle 3, -2, -1\rangle \\ &= 1\end{aligned}$$