11.2 #7

(a) $-\dfrac{\vec{v}}{\|\vec{v}\|} = \dfrac{-3\vec{i}-4\vec{j}}{\sqrt{3^2+4^2}} = -\dfrac{3}{5}\vec{i}-\dfrac{4}{5}\vec{j}$

(b) $\dfrac{\overrightarrow{P_1P_2}}{\|\overrightarrow{P_1P_2}\|} = \dfrac{\langle 2,-1,-3\rangle}{\sqrt{2^2+(-1)^2+(-3)^2}} = \left\langle \dfrac{2}{\sqrt{14}}, \dfrac{-1}{\sqrt{14}}, \dfrac{-3}{\sqrt{14}} \right\rangle$

[For parts (c) and (d), to get a vector of length k in same direction as $\vec{v}$, we need $k\dfrac{\vec{v}}{\|\vec{v}\|}$. For opposite direction, use minus sign.]

(c) $-\dfrac{1}{2}\|\vec{v}\|\dfrac{\vec{v}}{\|\vec{v}\|} = -\dfrac{1}{2}\vec{v} = \left\langle -\dfrac{1}{2}, -1, -\dfrac{3}{2} \right\rangle$

(d) $\sqrt{5}\dfrac{\vec{v}}{\|\vec{v}\|} = \sqrt{5}\dfrac{(\vec{i}-2\vec{j}+3\vec{k})}{\sqrt{1^2+(-2)^2+3^2}} = \dfrac{\sqrt{5}}{\sqrt{14}}\vec{i} - \dfrac{2\sqrt{5}}{\sqrt{14}}\vec{j} + \dfrac{3\sqrt{5}}{\sqrt{14}}\vec{k}$

(e) $\left\langle 4\cos\dfrac{\pi}{6}, 4\sin\dfrac{\pi}{6} \right\rangle = \left\langle 4\left(\dfrac{\sqrt{3}}{2}\right), 4\left(\dfrac{1}{2}\right) \right\rangle = \langle 2\sqrt{3}, 2\rangle$

(f) $\langle 2\cos 210^\circ, 2\sin 210^\circ\rangle = \left\langle 2\left(-\dfrac{\sqrt{3}}{2}\right), 2\left(-\dfrac{1}{2}\right)\right\rangle = \langle -\sqrt{3}, -1\rangle$