8.5, # 7 extended: Consider a vector $\mathbf{v} = \langle 6, -7 \rangle$ and a vector $\mathbf{w} = \langle -1, -4 \rangle$.

(a). Find $\mathbf{v} \cdot \mathbf{w}$.

(b). Find $\mathbf{v} \cdot \mathbf{v}$.

(c). Find $\mathbf{w} \cdot \mathbf{w}$.

(d). Find $||\mathbf{v}||$ and $||\mathbf{w}||$. How are these related to things we already know?

(e). Determine whether $||\mathbf{v}||\mathbf{w}$ is a scalar or a vector.

(f). Determine whether $2(\mathbf{v} \cdot \mathbf{w})\mathbf{w}$ is a scalar or a vector.

(g). Determine whether $(\mathbf{v}+\mathbf{w}) \cdot \mathbf{w}$ is a scalar or a vector.

(h). Find the angle θ between $\mathbf{v}$ and $\mathbf{w}$.

8.5, # 32: Let $\mathbf{v} = \langle a_1, b_1 \rangle$, $\mathbf{w} = \langle a_2, b_2 \rangle$, and $\mathbf{u} = \langle a_3, b_3 \rangle$. Prove that $\mathbf{v} \cdot (\mathbf{w} + \mathbf{u}) = \mathbf{v} \cdot \mathbf{w} + \mathbf{v} \cdot \mathbf{u}$.

8.5, # 33: If θ is the angle between two nonzero vectors $\mathbf{v}$ and $\mathbf{w}$, and $\mathbf{v} \cdot \mathbf{w} < 0$, what is the range of values θ can take (in degrees) and why?

8.5, Problem: Determine whether the following pairs of vectors are orthogonal, parallel, or neither.

(a). $\mathbf{v} = \frac{1}{4}\mathbf{i} - 3\mathbf{j}$ and $\mathbf{w} = 15\mathbf{i} + \frac{5}{4}\mathbf{j}$

(b). $\mathbf{r} = 17\mathbf{i} + 34\mathbf{j}$ and $\mathbf{s} = -5\mathbf{i} - 10\mathbf{j}$

(c). $\mathbf{a} = \langle 3, 5 \rangle$ and $\mathbf{b} = \langle -5, -3 \rangle$.