MA 213 Worksheet #3

Section 12.3
8/30/18

1 Find $\mathbf{a} \cdot \mathbf{b}$ for the following descriptions of $\mathbf{a}$ and $\mathbf{b}$.

12.3.3	$\mathbf{a} = \langle 1.5, 0.4 \rangle$,	$\mathbf{b} = \langle -4, 6 \rangle$	
12.3.5	$\mathbf{a} = \langle 4, 1, \frac{1}{4} \rangle$,	$\mathbf{b} = \langle 6, -3, -8 \rangle$	
12.3.7	$\mathbf{a} = 2\mathbf{i} + \mathbf{j}$,	$\mathbf{b} = \mathbf{i} - \mathbf{j} + \mathbf{k}$	
12.3.9	$\lvert\mathbf{a}\rvert = 7$,	$\lvert\mathbf{b}\rvert = 4$	the angle between $\mathbf{a}$ and $\mathbf{b}$ is $\pi/6$

2 Find the angle between the vectors.

12.3.15	$\mathbf{a} = \langle 4, 3 \rangle$,	$\mathbf{b} = \langle 2, -1 \rangle$
12.3.19	$\mathbf{a} = 4\mathbf{i} - 3\mathbf{j} + \mathbf{k}$,	$\mathbf{b} = 2\mathbf{i} - \mathbf{k}$

3 *12.3.25* Use vectors to decide whether the triangle with vertices $P(1, -3, -2)$, $Q(2, 0, -4)$, and $R(6, -2, -5)$ is right angled.

4 *12.3.27* Find a unit vector that is orthogonal to both $\mathbf{i} + \mathbf{j}$ and $\mathbf{i} + \mathbf{k}$.

5 *12.3.30* Find the acute angle between the lines.

$$x + 2y = 7, \quad 5x - y = 2$$

6 *12.3.31* Find the acute angles between the curves at their points of intersection.

$$y = x^2, \quad y = x^3$$

7 *12.3.41* Find the scalar and vector projections of b onto a.

$$\mathbf{a} = \langle 4, 7, -4 \rangle, \quad \mathbf{b} = \langle 3, -1, 1 \rangle$$

8 *12.3.45* Show that the vector $\operatorname{orth}_{\mathbf{a}} \mathbf{b} = \mathbf{b} - \operatorname{proj}_{\mathbf{a}} \mathbf{b}$ is orthogonal to $\mathbf{a}$.