

Math 2210 - Assignment 2

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1 Sections 11.3 and 11.4

1.1 Section 11.3

11.3.1 Let $\mathbf{a} = -2\mathbf{i} + 3\mathbf{j}$, $\mathbf{b} = 2\mathbf{i} - 3\mathbf{j}$, and $\mathbf{c} = -5\mathbf{j}$. Find each of the following:

1. $2\mathbf{a} - 4\mathbf{b}$

2. $\mathbf{a} \cdot \mathbf{b}$

3. $\mathbf{a} \cdot (\mathbf{b} + \mathbf{c})$

4. $(-2\mathbf{a} + 3\mathbf{b}) \cdot 5\mathbf{c}$

5. $\|\mathbf{a}\| \mathbf{c} \cdot \mathbf{a}$

6. $\mathbf{b} \cdot \mathbf{b} - \|\mathbf{b}\|^2$

11.3.6 let $\mathbf{a} = \langle \sqrt{2}, \sqrt{2}, 0 \rangle$, $\mathbf{b} = \langle 1, -1, 1 \rangle$, and $\mathbf{c} = \langle -2, 2, 1 \rangle$. Find each of the following:

1. $\mathbf{a} \cdot \mathbf{c}$

2. $(\mathbf{a} - \mathbf{c}) \cdot \mathbf{b}$

3. $\mathbf{a}/\|\mathbf{a}\|$

4. $(\mathbf{b} - \mathbf{c}) \cdot \mathbf{a}$

5. $\frac{\mathbf{b} \cdot \mathbf{c}}{\|\mathbf{b}\|\|\mathbf{c}\|}$

6. $\mathbf{a} \cdot \mathbf{a} - \|\mathbf{a}\|^2$

11.3.7 For the vectors \mathbf{a} , \mathbf{b} , and \mathbf{c} from Problem 6, find the angle between each pair of vectors.

11.3.31 Find the given projection if $\mathbf{u} = 3\mathbf{i} + 2\mathbf{j} + \mathbf{k}$, $\mathbf{v} = 2\mathbf{i} - \mathbf{k}$, and $\mathbf{w} = \mathbf{i} + 5\mathbf{j} - 3\mathbf{k}$:

$$\text{proj}_{\mathbf{u}} \mathbf{w}$$

11.3.66 Find the equation of the plane having the given normal vector \mathbf{n} and passing through the given point P .

$$\mathbf{n} = 3\mathbf{i} - 2\mathbf{j} - 1\mathbf{k}; P(-2, -3, 4)$$

11.3.74 Find the distance from $(2, 6, 3)$ to the plane $-3x + 2y + z = 9$.

1.2 Section 11.4

11.4.1 Let $\mathbf{a} = -3\mathbf{i} + 2\mathbf{j} - 2\mathbf{k}$, $\mathbf{b} = -\mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$, and $\mathbf{c} = 7\mathbf{i} + 3\mathbf{j} - 4\mathbf{k}$. Find each of the following:

1. $\mathbf{a} \times \mathbf{b}$

2. $\mathbf{a} \times (\mathbf{b} + \mathbf{c})$

3. $\mathbf{a} \cdot (\mathbf{b} + \mathbf{c})$

4. $\mathbf{a} \times (\mathbf{b} \times \mathbf{c})$

11.4.3 Find all vectors perpendicular to both of the vectors $\mathbf{a} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ and $\mathbf{b} = -2\mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$.

11.4.12 Find the equation of the plane through the points $(1, 1, 2)$, $(0, 0, 1)$,
and $(-2, -3, 0)$.

11.4.15 Find the equations of the plane through $(2, 5, 1)$ that is parallel to the plane $x - y + 2z = 4$.