MATH 2210 HOMEWORK WORKSHEET 2

Name: _____

The Cross Product

1. Find two unit vectors that are orthogonal to both $\mathbf{j} + 2\mathbf{k}$ and $\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$.

2. Suppose that $\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w}) = 2$. Find $\mathbf{v} \cdot (\mathbf{u} \times \mathbf{w})$.

3. Let $\mathbf{u}$ and $\mathbf{v}$ be any nonzero, non-parallel vectors in $\mathbb{R}^3$. Compute $(\mathbf{u} \times \mathbf{v}) \cdot \mathbf{v}$ and explain why your answer is right.

Equations of Lines and Planes

4. Find the vector equation, parametric equations, and symmetric equations for the line in $\mathbb{R}^3$ that passes through the points $(4, -1, 2)$ and $(1, 1, 5)$.

5. Find a vector parallel to the line whose symmetric equations are

$$\frac{x-4}{3} = \frac{y}{2} = z + 2.$$

6. Find an equation for the plane through $(3, -1, 1)$, $(4, 0, 2)$, and $(6, 3, 1)$.

7. Find the distance from the point $(-6, 3, 5)$ to the plane $x - 2y - 4z = 8$.

Cylinders and Quadric Surfaces

8. Identify and sketch the graph of the surface defined by

$$4x^2 + 4y^2 - 8y + z^2 = 0.$$

9. Find an equation for the surface consisting of all points that are equidistant from the point $(-1, 0, 0)$ and the plane $x = 1$. Identify the surface.