Problem Set 4

12.1.7 For the triangle with vertices P(3, -2, -3), Q(7, 0, 1), and R(1, 2, 1), find the lengths of the sides.

12.1.10c Find the distance between the point (4, -2, 6) and the x-z plane.

12.1.11 Find an equation of the sphere with a center (-3, 2, 5) and a radius of 4. What is the intersection of this sphere with the y-z plane?

12.1.15 Show that the equation $x^2 + y^2 + z^2 - 2x - 4y + 8z = 15$ represents a sphere and find its center and radius.

12.1.29 Describe in words the three-dimensional region represented by the equations $x^2 + y^2 = 4$ and $z = -1$.

12.1.36 Write inequalities to describe the region of a solid cylinder that lies on or below the plane $z = 8$ and on or above the disk in the x-y plane centered on the origin with a radius of 2.

12.2.6e For the vectors above, draw a diagram of $\mathbf{u} - 2\mathbf{v}$.

12.2.17 Find the sum of the vectors $< 3, 0, 1 >$ and $< 0, 8, 0 >$ and illustrate geometrically.

12.2.21 For the vectors $\mathbf{a} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$ and $\mathbf{b} = -2\mathbf{i} - \mathbf{j} - 5\mathbf{k}$, find:
$\mathbf{a} + \mathbf{b}$
$2\mathbf{a} + 3\mathbf{b}$
$|\mathbf{a}|$
$|\mathbf{a} - \mathbf{b}|$

12.2.23 Find a unit vector that has the same direction as the vector $-3\mathbf{i} + 7\mathbf{j}$.