

Math 21C  
Vogler  
Discussion Sheet 5

1.) Determine a formula (and sketch the surface) for the set of all points  $(x, y, z)$  in three-dimensional space which are

- 4 units from the point  $(2, -3, 0)$ .
- 3 units from the  $z$ -axis.
- $1/2$  unit from the  $x$ -axis.
- 2 units from the plane  $y = 3$ .
- equidistant from the points  $(3, 0, 0)$  and  $(0, 0, 3)$ .
- equidistant from the planes  $z = 2$  and  $z = 6$ .
- equidistant from the planes  $x = 3$  and  $y = 2$ .
- equidistant from the point  $(0, 0, 2)$  and the  $xy$ -plane.

2.) a.) If vector  $\vec{A} = \overrightarrow{(1, 0, -2)}$ , then what is the unit vector in the same direction as  $\vec{A}$ ?

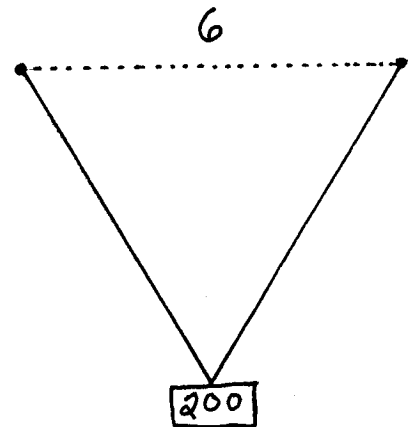
b.) If vector  $\vec{A} = \overrightarrow{(a, b, c)}$ , and  $a, b$ , and  $c$  are not all zero, then what is the unit vector in the same direction as  $\vec{A}$ ?

3.) Find two vectors of length 3 which are both perpendicular to

- vector  $\vec{W} = 3\vec{i} + 4\vec{j}$ .
- vector  $\vec{W} = \vec{i} - 2\vec{j} + 2\vec{k}$ .

4.) Two strong wires of equal length are hung from two supports which are at the same height and 6 feet apart. Each wire is attached to the same point of a 200 pound weight. What is the force of tension (in pounds) on each wire if the wires are each

- 5 feet long?
- 20 feet long?
- 3.1 feet long?
- 3.01 feet long?



5.) You can swim at a constant speed of 5 mph. You wish to swim across a river 1 mile wide and land at a point directly across the river from where you start swimming. If the river flows at the constant rate of 3 mph, in what direction should you swim to accomplish this? How long will it take you to swim across the river?

The following problem is for recreational purposes only.

6.) A circus is witnessed by 120 people who have paid a total of \$120. The women paid \$5 each, the men paid \$2 each, and the children paid 10 cents each. How many women and children went to the circus?