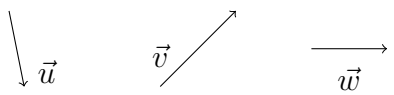
MATH 231: Calculus of Several Variables
Section 1, 107 Ag Sc & Ind Bldg,
TR 9:05 AM - 9:55 AM

Homework 2: Due Thursday, Sept 5

1. Read the Notes "Three Dimensional Coordinate System" and the notes "Vectors"
2. Determine if the following equation is a sphere. If it is, list its center and radius.
$$x^2 - 4x + y^2 - 2y + z^2 - 6z = -10$$
3. Consider the triangle with vertices at $P(2, 2, 0)$, $Q(2, 1, 3)$ and $R(3, 2, 1)$. Determine if the triangle is equilateral, isosceles, or scalene (no sides have equal measure).
4. The first octant is the region where $x \geq 0$, $y \geq 0$, and $z \geq 0$. What is the largest radius a sphere centered at $(7, 6, 5)$ can have and still be contained in the first octant?
5. Copy the vectors in the figure below and use them to draw the following vectors



   (a) $\vec{v} + \vec{w}$
   (b) $\vec{v} - \vec{w}$
   (c) $\vec{u} - \vec{v} + \vec{w}$
6. Find the unit vector that has the same direction as the following vectors
   (a) $\langle 4, 1, 7 \rangle$
   (b) $8\vec{i} - 2\vec{j} + 10\vec{k}$
7. Find the vector $\vec{AB}$ for each set of points
   (a) $A(0, 0, 0)$, $B(1, 2, 1)$
   (b) $A(1, 2, 12)$, $B(0, 0, 0)$
   (c) $A(1, 0, 20)$, $B(40, 1, 1)$
8. Find $\vec{v} + \vec{w}$ and $\vec{w} - \vec{v}$ for the following pair of vectors:
$$\vec{v} = \left\langle 2, \sqrt{2}, \pi \right\rangle \text{ and } \vec{w} = \left\langle -7, \sqrt{3}, \frac{\pi}{2} \right\rangle$$

Note: A vector written as $2\vec{i} + 3\vec{j} - \vec{k} = \langle 2, 3, -1 \rangle$. You just take the coefficients and write them in angled brackets. If you have not seen the $\vec{i}, \vec{j}, \vec{k}$, notation before, it's ok. You just need to know how to translate it. It is more common to see in physics. We will talk a little bit about what they mean on Thursday.