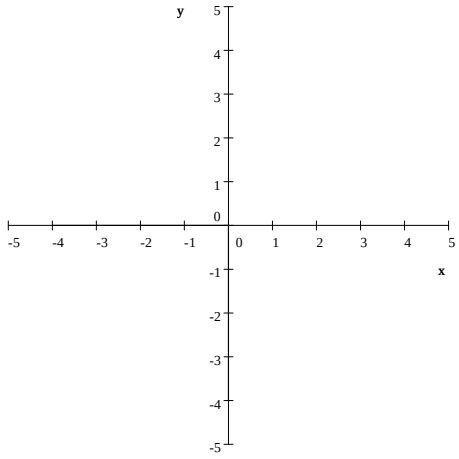
Quiz #01 – MATH 2421
Spring 2008

Kawai Name : _____

Directions: You may use a calculator. NO SHARING OF CALCULATORS! Show algebra. Be sure to highlight your final answer!

1. [1 *pt.*] Sketch the following 2D vector with THEIR TAILS AT THE ORIGIN.
   $\mathbf{a} = \langle -3,\ 1 \rangle$ and $\mathbf{b} = \langle 2,\ -2 \rangle$.



[1 *pt.*] Now find $(\mathbf{a} - \mathbf{b})$ algebraically and give its component form here.

$\mathbf{a} - \mathbf{b} = \langle ???,\ ??? \rangle$

[1 *pt.*] Now sketch in $(\mathbf{a} - \mathbf{b})$ in the diagram by connecting the appropriate points.

2. Let $\mathbf{a} = \langle -3,\ -2,\ 2 \rangle$.

   (a) [1 *pt.*] Find the unit vector associated with $\mathbf{a}$ which has the same direction as $\mathbf{a}$.

   (b) [1 *pt.*] Now find the vector which has magnitude 5 and has the OPPOSITE direction as $\mathbf{a}$.

3. [3 *pts*.] Here is the equation for a 3D sphere:

$$x^2 + y^2 - 10y + z^2 = 24$$

Rewrite it in the standard form

$$(x - x_1)^2 + (y - y_1)^2 + (z - z_1)^2 = R^2$$

where the center is located at $C\,(x_1,\ y_1,\ z_1)$ and the radius is R.

(a) Where is its center located?

(b) What is the length of the radius?

4. [2 *pts*.] Use the geometric form of the dot product to find the angle of separation between $\mathbf{a} = \langle -1,\ 1 \rangle$ and $\mathbf{b} = \langle 4,\ 3 \rangle$.

$$\mathbf{a} \cdot \mathbf{b} = \|\mathbf{a}\| * \|\mathbf{b}\| * \cos(\alpha)$$

Give your final answer in DEGREES rounded to one decimal place.