Show all your work completely, and simplify your final answers.

- 1. [5 points] Let  $\mathbf{u} = \langle 3, 6, -2 \rangle$  and  $\mathbf{v} = \langle 2, 1, -5 \rangle$ . Compute the following:
  - 1.a [1 point] The vector  $\mathbf{u} + \mathbf{v}$ .

Name:

Key

<3, 6, -27+<2, 1, -5> = <5, 7, -7>

- 1.b [1 point] The vector  $\mathbf{u} 2\mathbf{v}$ .  $\langle \mathbf{3}, \mathbf{6}, -2 \rangle - 2 \langle \mathbf{2}, \mathbf{1}, -5 \rangle$  $= \langle \mathbf{3}, \mathbf{6}, -2 \rangle - \langle \mathbf{4}, \mathbf{2}, -10 \rangle = \langle -1, \mathbf{4}, \mathbf{8} \rangle$
- 1.c [1 point] The value  $|\mathbf{u} 2\mathbf{v}|$ .

$$\sqrt{(-1)^2 + (4)^2 + (8)^2} = \sqrt{1 + 16 + 64} = \sqrt{81} = 9$$

1.d [1 point] The unit vector in the direction of  $\mathbf{u}-2\,\mathbf{v}$  .

1.e [1 point] The vector of magnitude 3 in the direction of  $\mathbf{u}-2\,\mathbf{v}$  .

$$3\langle \dot{\exists}, \ddot{\ddot{a}}, \dot{\ddot{a}} \rangle = \langle \ddot{\ddot{a}}, \ddot{\ddot{a}}, \ddot{\ddot{a}} \rangle$$
  
=  $\langle \dot{\ddot{3}}, \ddot{\ddot{3}}, \ddot{\ddot{s}} \rangle$ 

2. [4 points] Find the equation of a sphere in standard form that has center (1, -3, 2) and passes through the point (-5, -1, 5).

$$(x-1)^{2} + (y+3)^{2} + (z-2)^{2} = r^{2}$$
  
 $(-5-1)^{2} + (-1+3)^{2} + (5-2)^{2} = r^{2}$   
 $36 + 4 + 9 = 49 = r^{2}$   
 $(x-1)^{2} + (y+3)^{2} + (z-2)^{2} = 49$   
\* can also solve for r by Using the distance formula between the center and the point.

3. [1 point] What is your TA's name? You will need this information throughout the semester.

Abby Owens :