Q1. (5 points) a. Show that the equation $x^2 + y^2 + z^2 - 2x - 4y + 8z = 15$ represents a sphere. Find the center and radius of the sphere. Explain and show work.

$$x^2 + y^2 + z^2 - 2x - 4y + 8z = 15$$

$$(x^2 - 2x) + (y^2 - 4y) + (z^2 + 8z) = 15$$

$$(x^2 - 2x + 1) + (y^2 - 4y + 4) + (z^2 + 8z + 16) - 1 - 4 - 16 = 15$$

$$(x-1)^2 + (y-2)^2 + (z+4)^2 - 21 = 15$$

$$(x-1)^2 + (y-2)^2 + (z+4)^2 = 36$$

$$(x-1)^2 + (y-2)^2 + (z+4)^2 = 6^2$$

This is a sphere with center $(1, 2, -4)$ and radius 6.

b. Find the distance between the points $P(1, 2, 3)$ and $Q(2, 1, 2)$ in 3-dim. Cartesian space. Explain and show work.

$$|PQ| = \sqrt{(1-2)^2 + (2-1)^2 + (3-2)^2}$$

$$= \sqrt{1 + 1 + 1}$$

$$= \sqrt{3}$$

Q2. (5 points) **a.** Name **three or more skills** (*other than learning new math*) that you may expect to acquire, or improve upon, by taking this class. Feel free to elaborate.

b. Please mark one of the following. (This question is for data collection only; it has no point value for this quiz):

1. [   ] I will form a study group for this class and I **do not** need assistance to find study mates (I have friends in this class).

2. [   ] I would like to be in a study group for this class and I **do need** assistance to be paired up with a study mate.

3. [   ] I am not interested in joining a study group at this time. I will let you know if I change my mind, later on.