Name: Erik Sundblad

Worksheet 2

Exercise 1. Determine the center and radius of the sphere given by

$$x^2 + y^2 + z^2 - 2x + 6y - 8z = -1.$$

$(x^2-2x) + (y^2+6y) + (z^2-8z) = -1$

$+1+9+16$

$(x^2-2x+1) + (y^2+6y+9) + (z^2-8z+16) = -1+1+9+16$

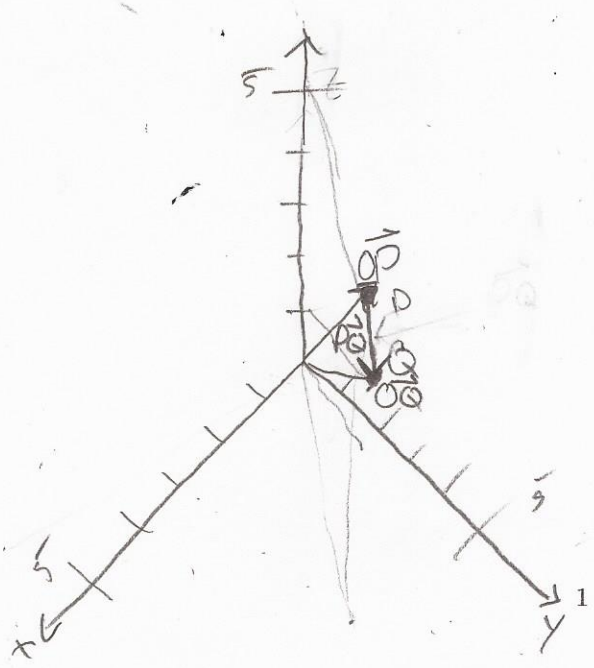
$(x-1)^2 + (y+3)^2 + (z-4)^2 = 25$

$\sqrt{25} = 5$

Center $(1, -3, 4)$

Radius $= 5$

Exercise 2. Plot the points $P(3,4,5)$ and $Q(1,2,1)$. Then, plot the vectors $\overrightarrow{OP} = \langle 3,4,5\rangle$, $\overrightarrow{OQ} = \langle 1,2,1\rangle$, and $\overrightarrow{PQ}$ and calculate the magnitude $|\overrightarrow{PQ}|$ and find the midpoint of the segment $\overline{PQ}$.



$\overrightarrow{PQ} = \langle 3-1, 4-2, 5-1\rangle$

$\overrightarrow{PQ} = \langle 2, 2, 4\rangle$

$|\overrightarrow{PQ}| = \sqrt{2^2+2^2+4^2}$

$4+4+16$

$|\overrightarrow{PQ}| = \sqrt{24} = 2\sqrt{6}$

Midpoint, $M = (x, y, z)$

$M = \left(\frac{3+1}{2}, \frac{4+2}{2}, \frac{5+1}{2}\right)$

$M = (2, 3, 3)$