Math 241H - Section 0301 - Fall 2017 Name:_____
Quiz 1

You have 15 minutes to complete this quiz. No calculator, cheat sheet or aid of any kind is allowed.

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1. Show that

$$x^2 + y^2 + z^2 + 4x - 2z + 10y = 6$$

is the equation for a sphere. Find the radius and the center of the sphere.

Solution. To do this we complete the square by adding 4, 25 and 1 to both sides of the equation,

$$x^2 + 4x + 4 + y^2 + 10y + 25 + z^2 - 2z + 1 = 6 + 4 + 25 + 1.$$

This gives

$$(x+2)^2 + (y+5)^2 + (z-1)^2 = 36 = 6^2.$$

Thefore the sphere is centered at $(-2, -5, 1)$ with a radius of 6.

2. Consider the vectors

$$\mathbf{a} = 2\mathbf{i} + 8\mathbf{j} - 4\mathbf{k}$$
$$\mathbf{b} = -\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}.$$

Recall that two non-zero vectors $\mathbf{a}$ and $\mathbf{b}$ are parallel if there exists a non-zero number c such that

$$\mathbf{a} = c\mathbf{b}.$$

Show that $\mathbf{a}$ and $\mathbf{b}$ are parallell and find the number c.

Solution. Note that

$$\mathbf{a} = 2(\mathbf{i} + 4\mathbf{j} - 2\mathbf{k}) = -2\mathbf{b}.$$

Therefore $\mathbf{a}$ and $\mathbf{b}$ are parallel with $c = -2$.