Math 9 F19 Quiz 1 **Name:** Solution

(1) (5 pts) Describe in words the region of $\mathbb{R}^3$ represented by the equations or inequality.

$$x^2 + y^2 + z^2 > 4x$$

+ 1 for moving 4x to the left

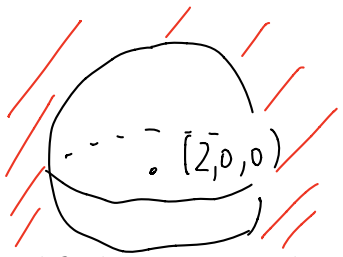
$x^2 + y^2 + z^2 - 4x > 0$ Complete the square to obtain

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

+ 3 for completing the square

This is the region outside of the sphere of radius 2 center at $(2,0,0)$.

+1 for the correct description.



(2) (5 pts) Show that the equation represent a sphere, and find its center and radius.

$$x^2 + y^2 + z^2 = 3 - 4x + 6y - 2z$$

$x^2 + y^2 + z^2 + 4x - 6y + 2z = 3$

$(x^2 + 4x) + (y^2 - 6y) + (z^2 + 2z) = 3$

$(x+2)^2 + (y-3)^2 + (z+1)^2 = 3 + 4 + 9 + 1 = 17$

The radius is $\sqrt{17}$ and center is

$(-2, 3, -1)$