

## Problemas del libro

En los ejercicios 20 a 25, determine la grafica de la ecuacion.

20

$$x^2 + y^2 + z^2 - 8y + 6z - 25 = 0$$

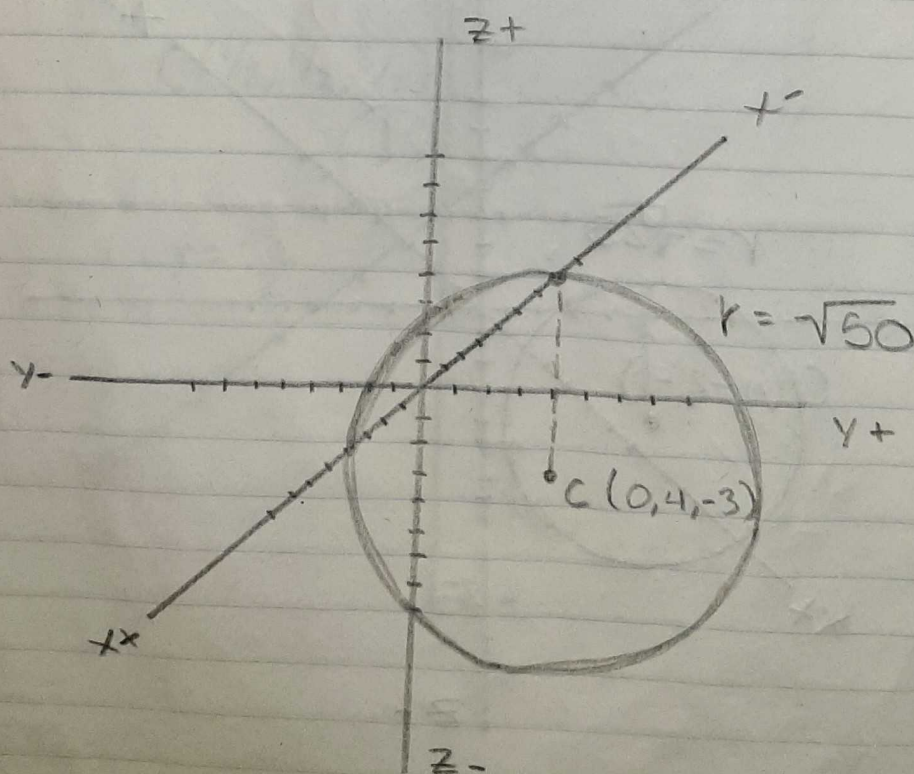
$$x^2 + y^2 - 8y + z^2 + 6z = 25$$

$$x^2 + y^2 - 8y + 16 + z^2 + 6z + 9 = 25 + 16 + 9$$

$$(x+0)^2 + (y-4)^2 + (z+3)^2 = 50$$

$$\text{Centro} = (0, 4, -3)$$

$$\text{radio} = \sqrt{50} = 7.071$$





21

$$x^2 + y^2 + z^2 - 8x + 4y + 2z - 4 = 0$$

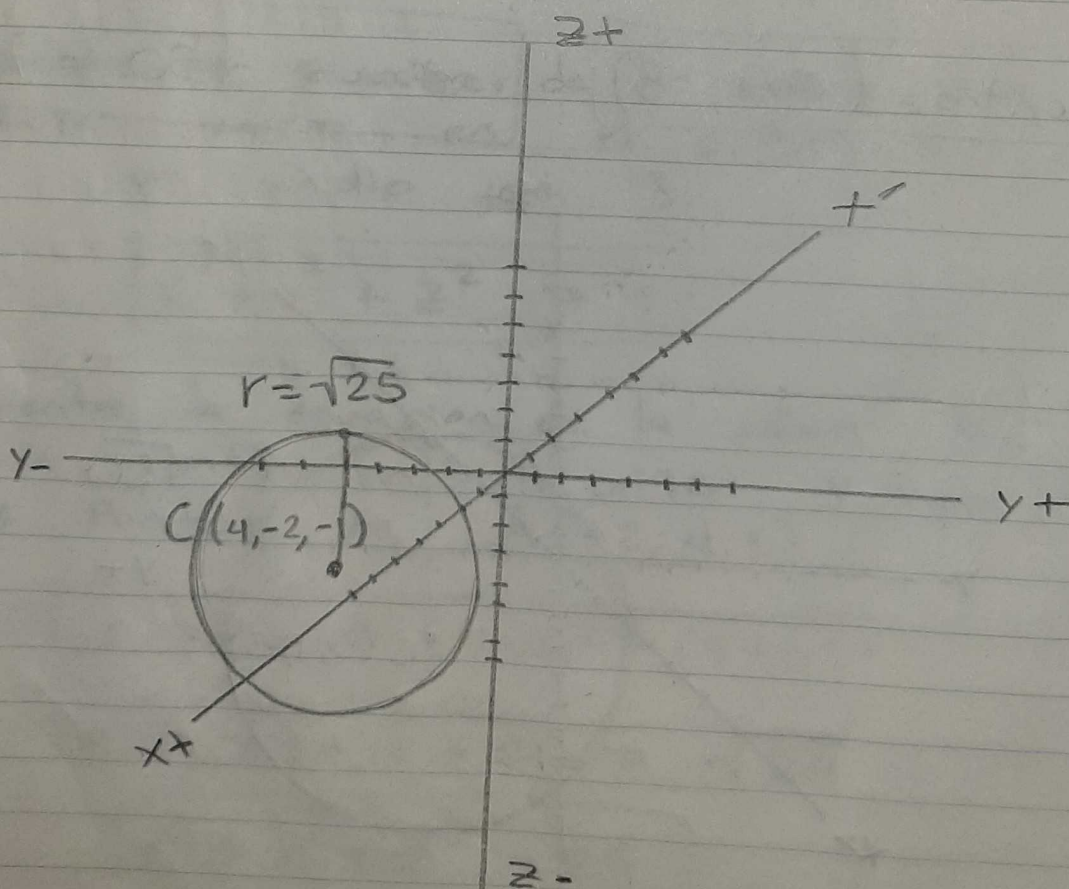
$$x^2 - 8x + y^2 + 4y + z^2 + 2z = 4$$

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

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

$$\text{Centro} = (4, -2, -1)$$

$$\text{radio} = \sqrt{25} = 5$$





22

$$x^2 + y^2 + z^2 - x - y - 3z + 2 = 0$$

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

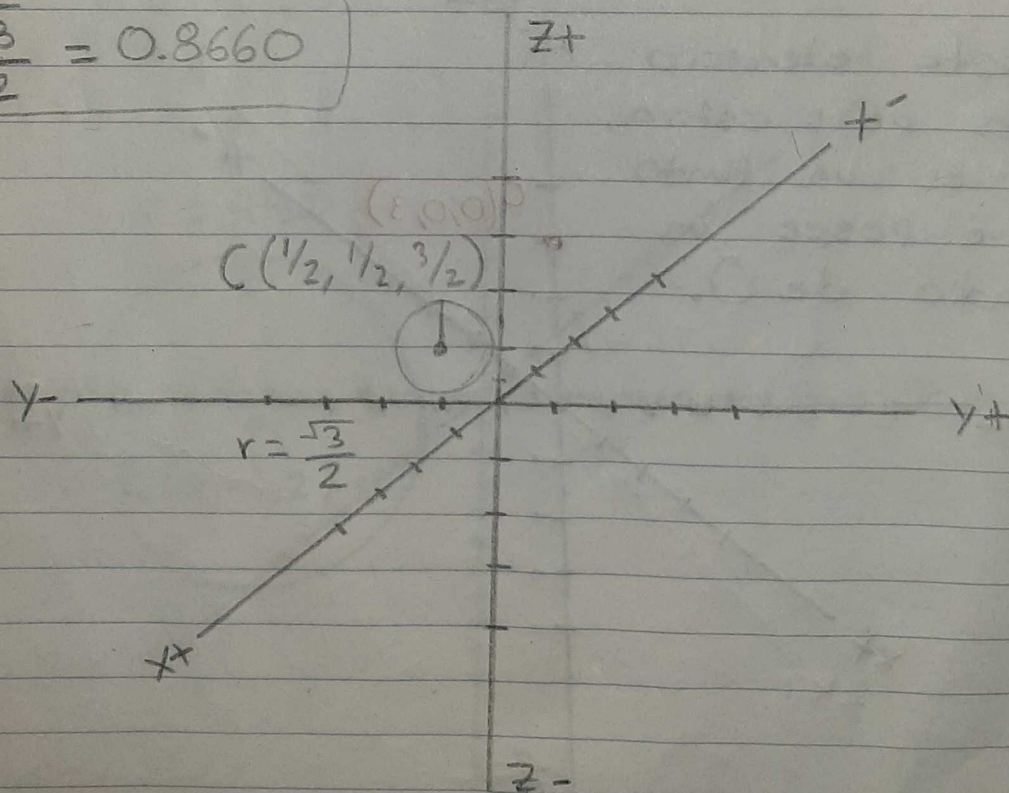
$$x^2 - x + \frac{1}{4} + y^2 - y + \frac{1}{4} + z^2 - 3z + \frac{9}{4} = -2 + \frac{2}{4} + \frac{9}{4}$$

$$(x - \frac{1}{2})^2 + (y - \frac{1}{2})^2 + (z - \frac{3}{2})^2 = \frac{3}{4}$$

$$\text{Centro} = (\frac{1}{2}, \frac{1}{2}, \frac{3}{2})$$

$$\text{radio} = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$$

$$\frac{\sqrt{3}}{2} = 0.8660$$





23

$$x^2 + y^2 + z^2 - 6z + 9 = 0$$

$$x^2 + y^2 + z^2 - 6z = -9$$

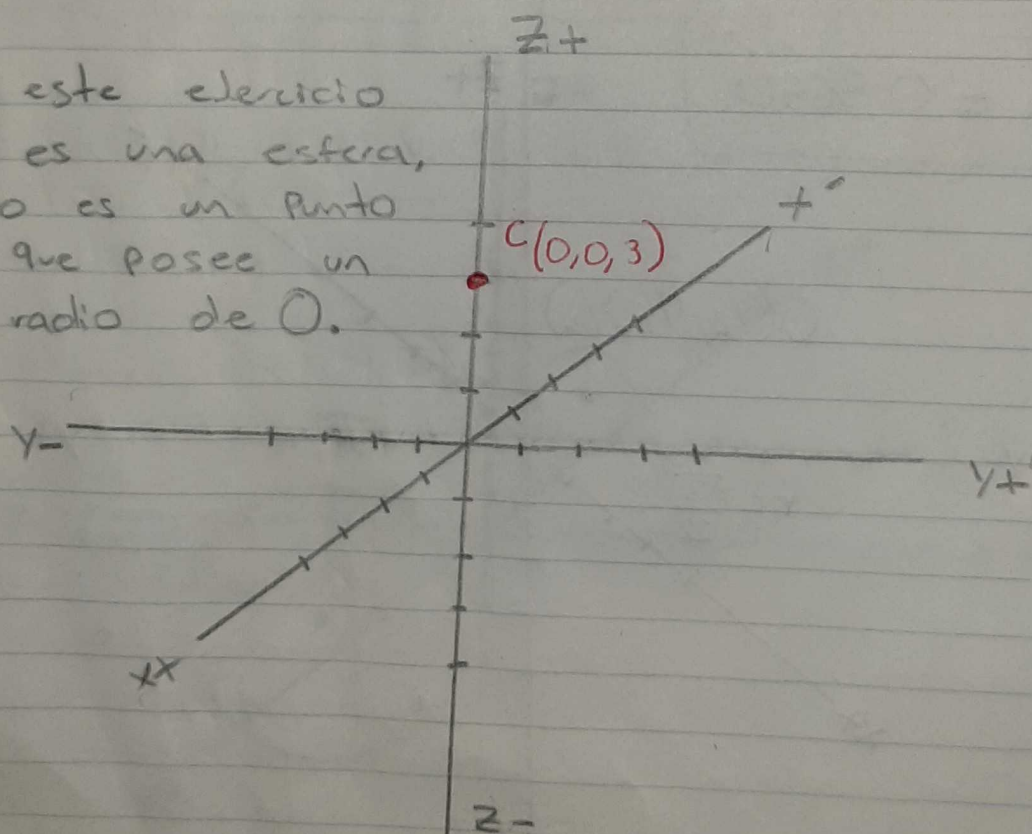
$$x^2 + \underline{0} + y^2 + \underline{0} + z^2 - 6z + \underline{9} = -9 + 0 + 0 + 9$$

$$(x+0)^2 + (y+0)^2 + (z-3)^2 = 0$$

Centro  $(0, 0, 3)$

radio  $= 0$

En este ejercicio  
No es una esfera,  
solo es un punto  
ya que posee un  
radio de 0.





24

$$x^2 + y^2 + z^2 - 8x + 10y - 4z + 13 = 0$$

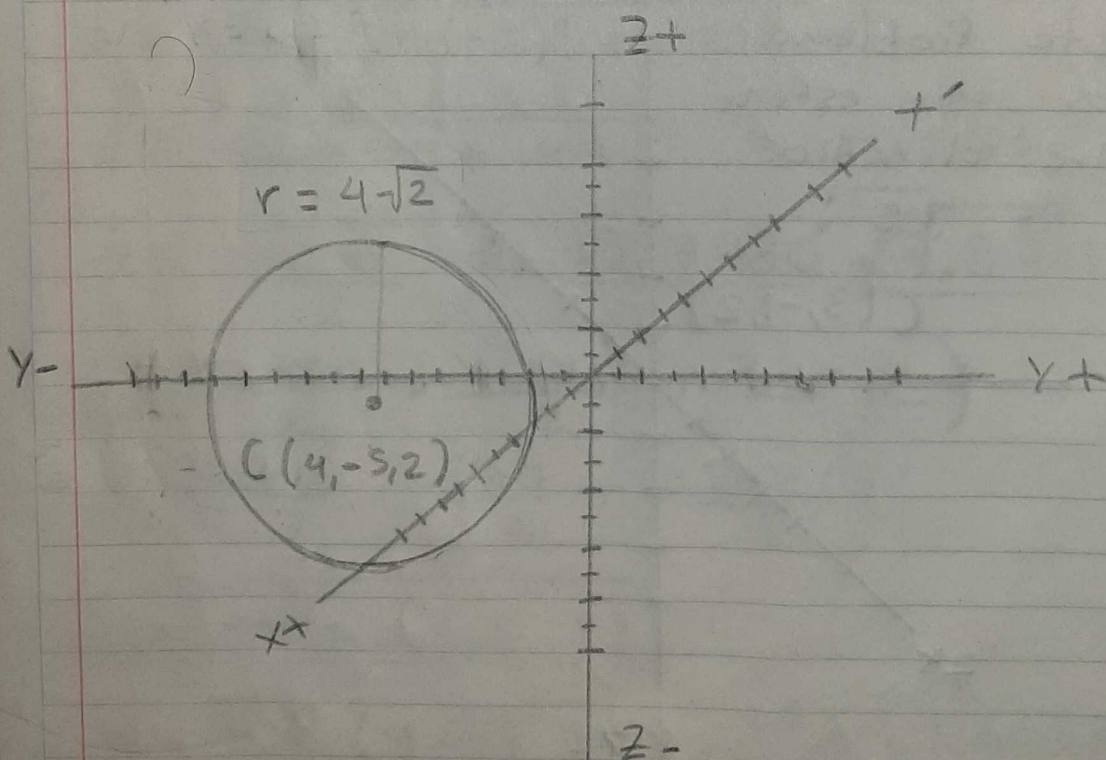
$$x^2 - 8x + y^2 + 10y + z^2 - 4z = -13$$

$$x^2 - 8x + 16 + y^2 + 10y + 25 + z^2 - 4z + 4 = -13 + 16 + 25 + 4$$

$$(x - 4)^2 + (y + 5)^2 + (z - 2)^2 = 32$$

$$\text{Centro} = (4, -5, 2)$$

$$\begin{aligned} \text{radio} &= \sqrt{32} = \sqrt{16 \times 2} \\ &= 4\sqrt{2} = 5.6568 \end{aligned}$$





25

$$x^2 + y^2 + z^2 - 6x + 2y - 4z + 19 = 0$$

$$x^2 - 6x + y^2 + 2y + z^2 - 4z = -19$$

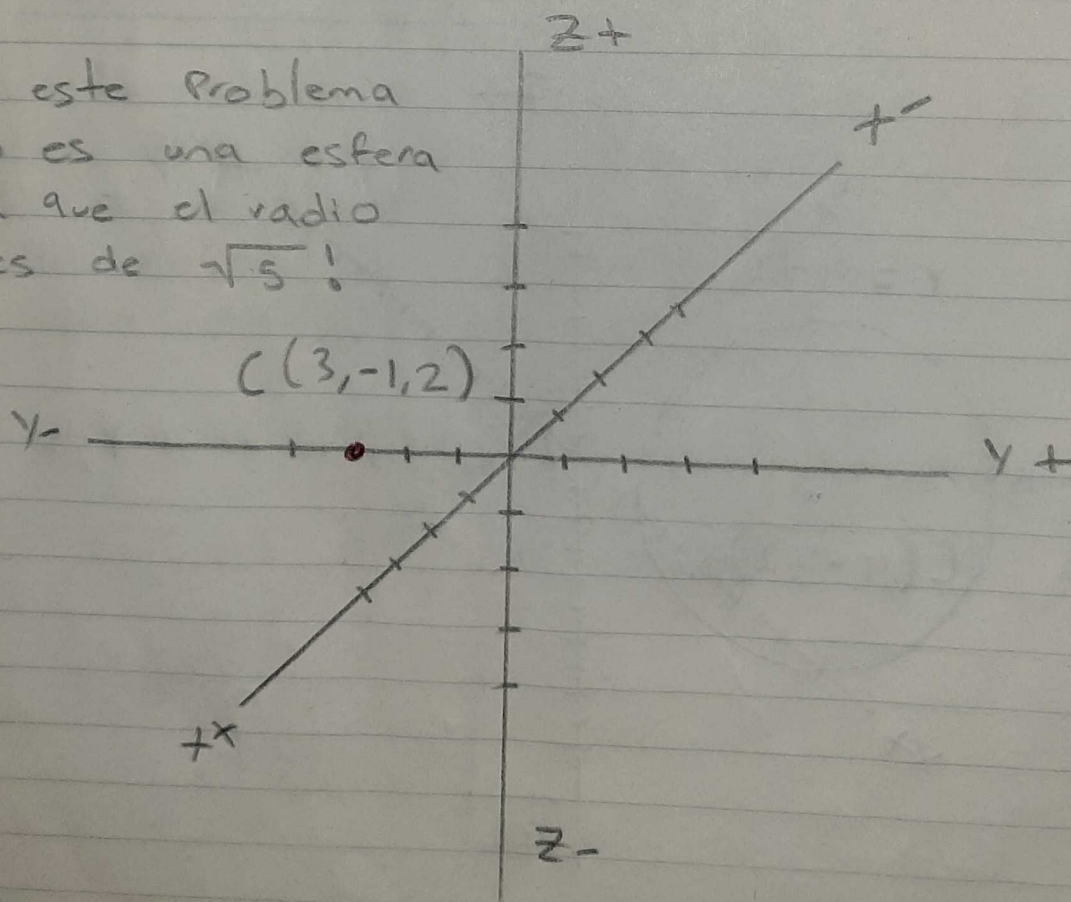
$$x^2 - 6x + \underline{9} + y^2 + 2y + \underline{1} + z^2 - 4z + \underline{4} = -19 + 9 + 1 + 4$$

$$(x-3)^2 + (y+1)^2 + (z-2)^2 = -5$$

Centro  $(3, -1, 2)$

$$\text{radio} = \sqrt{-5} = \sqrt{5}!$$

En este Problema  
No es una esfera  
ya que el radio  
es de  $\sqrt{5}!$





En los ejercicios 26 a 28, obtenga una ecuación de la esfera que satisface las condiciones indicadas

26 Uno de sus diámetros es el segmento de recta que tiene extremos en  $(6, 2, 5)$  y  $(-4, 0, 7)$ .

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

$$d = \sqrt{(-10)^2 + (-2)^2 + (12)^2}$$

$$d = \sqrt{100 + 4 + 144} = \sqrt{248}$$

$$r = \frac{\sqrt{248}}{2} = \frac{15.7480}{2} = 7.874$$

$$P_m \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

$$P_m \left( \frac{6 + (-4)}{2}, \frac{2 + 0}{2}, \frac{5 + 7}{2} \right)$$

$$\text{Centro} = (1, 1, 1)$$

$$(x - 1)^2 + (y - 1)^2 + (z - 1)^2 = 61.9998$$

$$x^2 - 2x + 1 + y^2 - 2y + 1 + z^2 - 2z + 1 = 61.9998$$

$$x^2 - 2x + y^2 - 2y + z^2 - 2z = 58.9998$$



27

Es concéntrica con la esfera  
Que tiene la ecuación  
 $x^2 + y^2 + z^2 - 2y + 8z - 9 = 0$  y tiene  
radio 3.

$$x^2 + y^2 - 2y + z^2 + 8z = 9$$

$$x^2 + y^2 - 2y + \underline{1} + z^2 + 8z + 16 = 9 + 1 + 16$$

$$(x+0)^2 + (y-1)^2 + (z+4)^2 = 26$$

$$C = (0, 1, -4) \quad r = \sqrt{26}$$



2

$$x^2 + y^2 + z^2 - 5x + 6y - 3z = 3$$

$$x^2 - 5x + \frac{25}{4} + y^2 + 6y + 9 + z^2 - 3z + \frac{9}{4}$$

$$= 3 + \frac{25}{4} + 9 + \frac{9}{4} = \boxed{\frac{41}{2}}$$

$$(x - 5/2)^2 + (y + 3)^2 + (z - 3/2)^2 = 41/2$$

$$\boxed{\text{Centro} = (5/2, -3, 3/2)} \quad \boxed{R = 41/2} = 4.5276$$

$$A) x^2 + y^2 + z^2 - 5x + 6y - 3z = -15$$

$$x^2 - 5x + \frac{25}{4} + y^2 + 6y + 9 + z^2 - 3z + \frac{9}{4} = \frac{25}{4} + 9 + \frac{9}{4}$$

$$(x - 5/2)^2 + (y + 3)^2 + (z - 3/2)^2 = 35/2 - 1.5$$

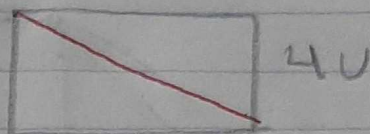
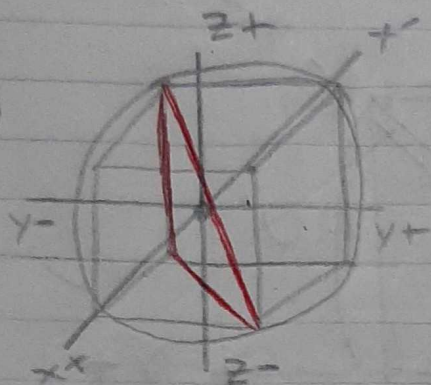
$$\boxed{\text{Centro} = (5/2, -3, 3/2)} \quad \boxed{R = \sqrt{16}}$$

$$\boxed{R = 4.1}$$



- ① conjunto de Puntos que se encuentran a la misma distancia (radio) de un Punto denominado centro.

③

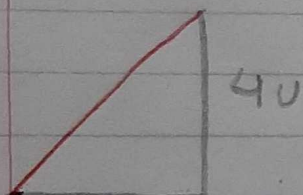


$$H_1^2 = C_0^2 + C_A^2$$

$$H_1^2 = 4^2 + 4^2$$

$$H_1^2 = 16 + 16$$

$$\sqrt{H_1^2} = \sqrt{32}$$



$$5.6568U$$

$$H_1 = 5.6568$$

$$H_2^2 = 4^2 + 5.6568^2$$

$$\sqrt{H_2^2} = \sqrt{4^2 + 5.6568^2}$$

$$H_2 = 6.9281$$

$$\text{Diametro} = 6.9281$$

$$r = \frac{6.9281}{2}$$

$$r = 3.4641$$



3

