

1. $x^2 + y^2 + z^2 - 6x + 4y - 2z = 11$

$P_0 = (a, b, c) \wedge b : (x - a)^2 + (y - b)^2 + (z - c)^2 = r^2$ entonces

b es un círculo con centro en P_0 y radio r

$$x^2 + y^2 + z^2 - 2ax + a^2 - 2by + b^2 - 2cz + c^2 = x^2 + y^2 + z^2 - 6x + 4y - 2z + j = 11 + j$$

- $-2ax = -6x \equiv a = 3$
- $-2by = 4y \equiv b = -2$
- $-2cz = -2z \equiv c = 1$

$$(x - 3)^2 + (y + 2)^2 + (z - 1)^2 \equiv$$

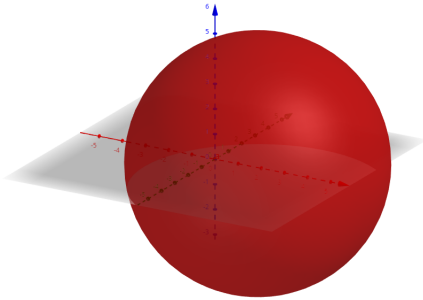
$$(x^2 - 6x + 9) + (y^2 + 4y + 4) + (z^2 - 2z + 1) = 11 + j \equiv$$

$$(x^2 + y^2 + z^2) - 6x + 4y - 2z + 9 + 4 + 1 = 11 + j \equiv$$

$$(x^2 + y^2 + z^2) - 6x + 4y - 2z + 14 = 11 + j \equiv$$

$$(x^2 + y^2 + z^2) - 6x + 4y - 2z = 25$$

Es un círculo con centro en $(3, -2, 1)$ y radio 5



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

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

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

$$x^2 + y^2 + z^2 - 2ax + a^2 - 2by + b^2 - 2cz + c^2 = x^2 + y^2 + z^2 - 2x + 4y = \frac{1}{4}$$

$$x^2 + y^2 + z^2 - 2ax + a^2 - 2by + b^2 - 2cz + c^2 = x^2 + y^2 + z^2 - 2x + 4y = \frac{1}{4}$$

- $-2ax = -2x \equiv a = 1$
- $-2by = 4y \equiv b = -2$
- $-2cz = 0 \equiv c = 0$

$$(x - 1)^2 + (y + 2)^2 + (z)^2 \equiv$$

$$x^2 + -2x + 1 + y^2 + 4y + 4 + z^2 \equiv$$

$$(x^2 + y^2 + z^2 - 2x + 4y) + 5 = \frac{1}{4} + 5 \equiv$$

$$x^2 + y^2 + z^2 - 2x + 4y + 5 = \frac{21}{4}$$

$$(x - 1)^2 + (y + 2)^2 + (z)^2 = \frac{21}{4}$$

Es un círculo con centro en $(1, -2, 0)$ y radio $\frac{\sqrt{21}}{2}$

