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A AO2

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$$\begin{cases} \text{I} & S_1: x^2+y^2+z^2-4z=0 \\ \text{II} & S_2: x^2+y^2+2y=0 \end{cases}$$

a)

I: $x^2+y^2+z^2-4z+4-4=0$

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

Esfera: $(x-x_0)^2+(y-y_0)^2+(z-z_0)^2=R^2$

Centro: $C=(0,0,2)$

Raio: $R=2$

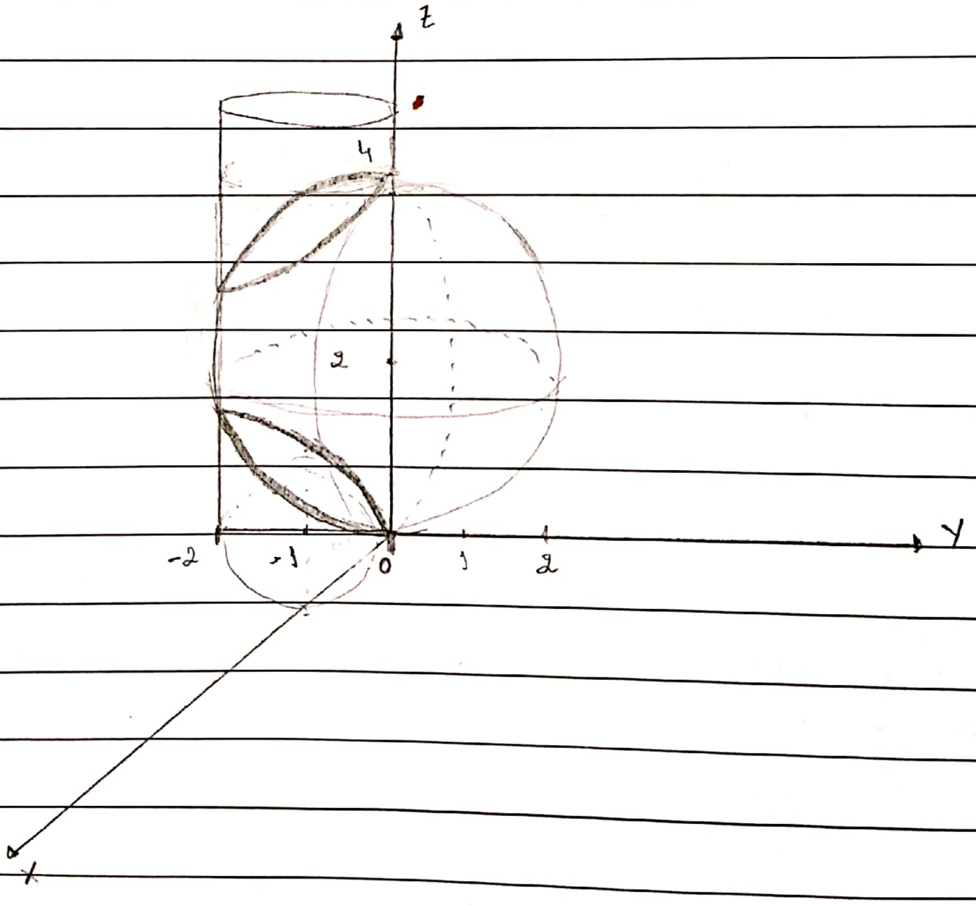
II: $x^2+y^2+2y+1-1=0$

$x^2+(y+1)^2=1$

Cilindro: $(x-x_0)^2+(y-y_0)^2=R^2$

Centro: $C=(0,-1)$

Raio: 1



b) $I: x^2+y^2+z^2-4z = II: x^2+y^2+2y$

$z^2-4z = 2y$

$(z-2)^2-4 = 2y$

$\sqrt{(z-2)^2} = \sqrt{2y+4}$

$z-2 = \sqrt{2y+4}$

$z = \pm\sqrt{2y+4}+2$

$x^2+y^2+2y = 0$

$x^2 = -y^2-2y$

$x = \pm\sqrt{-y^2-2y}$

Assim:

$$\begin{cases} x(t) = \pm\sqrt{-t^2-2t} \\ y(t) = t \\ z(t) = \pm\sqrt{2t+4}+2 \end{cases} \qquad -2 \leq t \leq 0$$

e)

$$\vec{f}(t) = \pm\left(\sqrt{-t^2-2t}\right)\hat{i} + (t)\hat{j} \pm \left(\sqrt{2t+4}+2\right)\hat{k}$$

$$\vec{f}'(t) = (x'(t))\hat{i} + (y'(t))\hat{j} + (z'(t))\hat{k}$$

$x'(t) = (-t^2-2t)^{1/2}$

$x'(t) = \frac{1}{2}(-t^2-2t)^{1/2-1}\cdot(-2t-2)$

$x'(t) = \dfrac{-2t-2}{2\sqrt{-t^2-2t}}$

$x'(t) = \pm\left(\dfrac{-t-1}{\sqrt{-t^2-2t}}\right)$

$y'(t) = 1$

$z'(t) = (2t+4)^{1/2}+2$

$z'(t) = \frac{1}{2}(2t+4)^{-1/2}\cdot(2)+0$

$z'(t) = \dfrac{\cancel{2}}{\cancel{2}\sqrt{2t+4}}$

$z'(t) = \pm\left(\dfrac{1}{\sqrt{2t+4}}\right)$

$$\therefore \vec{f}'(t) = \pm\left(\frac{-t-1}{\sqrt{-t^2-2t}}\right)\hat{i} + \hat{j} \pm \left(\frac{1}{\sqrt{2t+4}}\right)$$