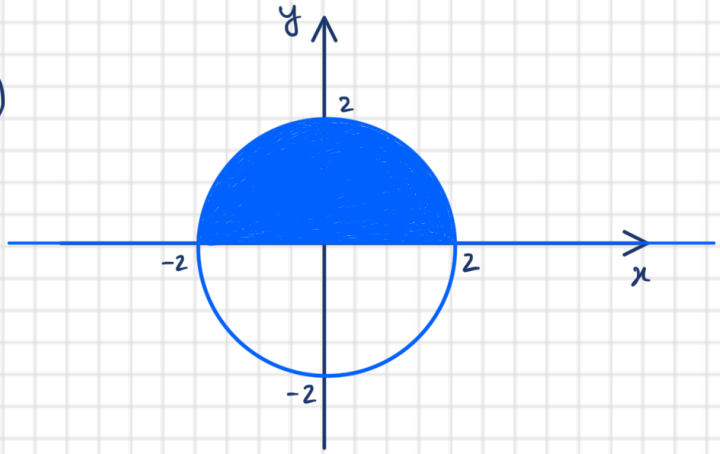
Proposta de resolução do TG1 (Análise LEC → 2023-24)

1 Considere o conjunto A definido por

$$A = \{(x,y) \in \mathbb{R}^2 : x^2+y^2 < 4 \text{ e } y > 0\} \cup \{(x,y) \in \mathbb{R}^2 : x^2+y^2 = 4 \text{ ou } y = 0\}$$

a)



b) $\mathring{A} = \{(x,y) \in \mathbb{R}^2 : x^2+y^2 < 4 \text{ e } y > 0\}$

c) $\bar{A} = A$

d) $fr(A) = \{(x,y) \in \mathbb{R}^2 : x^2+y^2 = 4 \text{ ou } y = 0\}$

2 $f : D \subseteq \mathbb{R}^2 \longrightarrow \mathbb{R}$

$(x,y) \longmapsto \sqrt{\frac{x}{2} - y^2}$

a) $D = \{(x,y) \in \mathbb{R}^2 : \frac{x}{2} - y^2 \geq 0\}$

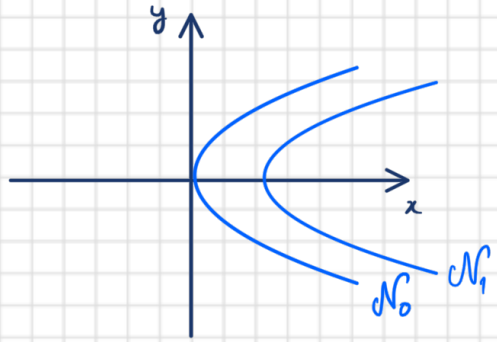
b) $N_0 = \{(x,y) \in D : \sqrt{\frac{x}{2} - y^2} = 0\}$

$\sqrt{\frac{x}{2} - y^2} = 0 \Leftrightarrow \frac{x}{2} - y^2 = 0 \Leftrightarrow x = 2y^2$

é uma parábola

c) $N_1 = \{(x,y) \in \mathbb{R}^2 : \sqrt{\frac{x}{2} - y^2} = 1\}$

$\sqrt{\frac{x}{2} - y^2} = 1 \Leftrightarrow \frac{x}{2} - y^2 = 1 \Leftrightarrow x = 2y^2 + 2$



d) $Gr(f) = \left\{(x,y,z) \in \mathbb{R}^3 : x \geq 2y^2 \text{ e } z = \sqrt{\frac{x}{2} - y^2}\right\}$

$z = \sqrt{\frac{x}{2} - y^2} \Rightarrow z^2 = \frac{x}{2} - y^2 \Leftrightarrow x = 2z^2 + 2y^2$

equação de um paraboloide elíptico.