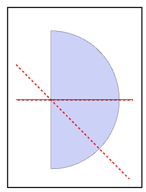
Análise Matemática II

2017/18

Lista de Exercícios 1 — Respostas

4.
a) $D = \left\{(x_1, x_2) \in \mathbb{R}^2 : x_1 + x_2 \neq 0,\ x_1 > 0 \text{ e } 9 - x_1^2 - x_2^2 \geq 0\right\}$



b) $\operatorname{int}(D) = \left\{(x_1, x_2) \in \mathbb{R}^2 : x_1 \neq -x_2 \ \text{ e } \ x_1 > 0 \text{ e } x_1^2 + x_2^2 < 9\right\}$,
$\operatorname{fr}(D) = \left\{(x_1, x_2) \in \mathbb{R}^2 : (x_1 = -x_2 \ \wedge \ 0 \leq x_1 \leq 3) \ \vee \ (0 \leq x_1 \wedge x_1^2 + x_2^2 = 9) \vee (x_1 = 0 \wedge -3 \leq x_2 \leq 3)\right\}$,

$\operatorname{ext}(D) = \mathbb{R}^2 \setminus \operatorname{ad}(D)$.

5.
a) $f(0,1) = 5,\ f(-2,3) = 75$ e $f(2,-3) = 69$.
b) $g(1,0) = 0,\ g(-3,4) = -\dfrac{24}{25}$ e $g(5,5) = 1$.
c) $f(-1,0) = 0$; $f(e,0) = 1$ e $f(-3,-4) = \log(5)$.

6.
a) $V(l,r) = \pi\left(\dfrac{4r^3}{3} + lr^2\right) m^3$.
b) $V(8,1) = \dfrac{28\pi}{3} m^3$.

7.
a) $IMC(98, 1.65) = 35.9$.
b) $60 \leq P \leq 81$.

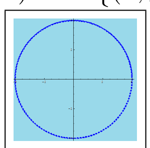
8.
a) $P(1000, 2) = 0.004\ \mu g/m$.
b) $0.01m$.

9. $v(4 \times 10^3, 7.5 \times 10^{-3}, 1.675, 4 \times 10^{-3}, 2.7 \times 10^{-3}) = 8.89994$.

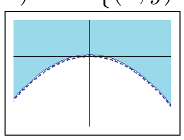
10.

a) $D_P = \{(T,C) \in \mathbb{R}^2 : T \geq 0, C \geq 0\}$.
b) $P(194, 407) = 235.8$.
c) $P(2T, 2C) = 1,01(2T)^{3/4}(2C)^{1/4} = 2P(T,C)$
d) $P(kT, kC) = kP(T,C)$

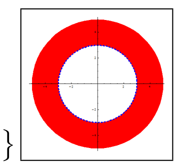
11. Encontre o domínio D das funções seguintes e, quando possível, represente-o graficamente:
a) $D = \{(x,y) \in \mathbb{R}^2 : x^2 + y^2 \neq 16\}$,



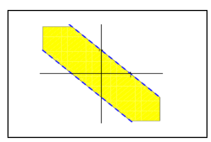
b) $D = \{(x,y) \in \mathbb{R}^2 : y > -x^2\}$,



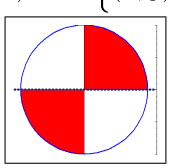
c) $D = \{(x,y) \in \mathbb{R}^2 : x^2 + y^2 \leq 25 \text{ e } x^2 + y^2 > 9\}$



d) $D = \{(x,y) \in \mathbb{R}^2 : -1 - x \leq y \leq 1 - x\}$



e) $D = \left\{(x,y) \in \mathbb{R}^2 : x \neq 0 \text{ e } \dfrac{y}{x} > 0 \text{ e } -1 \leq x^2 + y^2 \leq 1\right\}$



12. Para as funções seguintes, indique o seu domínio, o limite na origem (se existir) e o conjunto onde a função é contínua:

a) $f(x,y) = \dfrac{x^2 - 2}{3 + xy}$.
b) $D_r = \mathbb{R}^2$ e $\lim_{(x,y)\to(0,0)} g(x,y) = 0$, g é contínua em $\mathbb{R}^2$.
c) $D = \{(x,y) \in \mathbb{R}^2 : 3x^2 - y^2 \neq 0\} \cup \{(0,0)\}$, não tem limite na origem, é contínua em $\mathbb{R}^2 \setminus \{(0,0)\}$.
d) $D = \mathbb{R}^2$, $\lim_{(x,y)\to(0,0)} p(x,y) = 0$, p é contínua em $\mathbb{R}^2$.

e) $D_r = \mathbb{R}^2 \backslash \{(0,0)\}$ e $\lim_{(x,y)\to(0,0)} r(x,y) = 0$.

14. Estude a continuidade das funções:
a)

$$f(x,y) = \begin{cases} \dfrac{\operatorname{sen}\left(x^2\right)}{x^2+y^2}, & (x,y) \neq (0,0), \\ 0, & (x,y) = (0,0). \end{cases}$$

b) É contínua em $\mathbb{R}^2 \backslash \{(2,y) : y \neq 7\}$