# Cálculo II
# Lista 2 - Funções de Várias Variáveis

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## Lista 1.4 (pg. 26)

- 2
  $D_A = 1300 - 50x + 20y$
  $D_B = 1700 + 12x - 20y$
  $R_x = x.D_A$
  $R_y = y.D_B$
  $R_T = x.D_A + y.D_B$

$$R_T = 1300x - 50x^2 + 20xy + 1700y + 12xy - 20y^2$$

$$R_T = 32xy - 50x^2 - 20y^2 + 1300x + 1700y$$

- 3.a
  $z = 3 - x - y$

$$D(z) = \mathbb{R}^2$$

$$Im(z) = \mathbb{R}$$

- 3.b
  $f(x, y) = 1 + x^2 + y^2$

$$D(f(x, y)) = \mathbb{R}^2$$

$$Im(f(x, y)) = [1, \infty)$$

- 3.c
  $z = \sqrt{9 - (x^2 + y^2)}$
  $x^2 + y^2 \leq 3^2$
  $x^2 + y^2 - 9 \leq 0$

$$D(z) = \{(x, y) \in \mathbb{R}^2 / x^2 + y^2 \leq 9\}$$

$\sqrt{9 - (x^2 + y^2)} \rightarrow \sqrt{9 - 9} = 0$
$x^2 + y^2 \geq 0 \rightarrow \sqrt{9 - 0} = 3$

$$Im(z) = [0, 3]$$

- 3.d
  $w = e^{x^2+y^2+z^2}$

$$D(w) = \mathbb{R}^3$$

$$Im(w) = [1, \infty)$$

- 3.j
  $f(x, y) = 4 - x^2 - y^2$

$$D(f(x, y)) = \mathbb{R}^2$$

$$Im(f(x, y)) = (-\infty, 4]$$

- 4.b
  $w = \dfrac{1}{x^2 + y^2 + z^2}$
  $x^2 + y^2 + z^2 \geq 0$

$$D(w) = \{(x, y, z) \in \mathbb{R}^3 / (x, y, z) \neq (0, 0, 0)\}$$

$$Im(w) = (0, \infty)$$

- 4.c
  $z = \dfrac{1}{\sqrt{x^2 - y^2}}$
  $x^2 - y^2 > 0$

$$D(z) = \{(x, y) \in \mathbb{R}^2 / |x| > |y|\}$$

$$Im(z) = (0, \infty)$$

- 4.e
  $z = \sqrt{x^2 + y^2 - 1}$
  $x^2 + y^2 - 1 \geq 0$

$$D(z) = \{(x, y) \in \mathbb{R}^2 / x^2 + y^1 \geq 1\}$$

$$Im(z) = [0, \infty)$$

- 4.i
  $y = \sqrt{\dfrac{1 + x}{1 + z}}$
  $1 + z \neq 0$ & $\dfrac{1 + x}{1 + z} \geq 0$
  $z \neq -1$
  $x \geq -1$ se $z > -1$
  $x \leq -1$ se $z < -1$

$$D(y) = \{(x, z) \in \mathbb{R}^2 / x \geq -1 se z > -1$$
$$x \leq -1 se z < -1\}$$

- 4.j
  $w = \dfrac{1}{9 - x^2 - y^2 - z^2}$
  $9 - x^2 - y^2 - z^2 \neq 0$
  $x^2 + y^2 + z^2 \neq 9$

  $$D(w) = \{(x, y, z) \in \mathbb{R}^3 / x^2 + y^2 + z^2 \neq 9\}$$

- 4.n
  $z = \ln(x + y - 3)$

  $$D(z) = \{(x, y) \in \mathbb{R}^2 / x + y > 3\}$$

- 4.p
  $f(x, y, z) = \sqrt{1 - x^2} + \sqrt{1 - y^2} - \sqrt{1 - z^2}$
  $1 - x^2 \geq 0$ logo $|x|^2 \leq 1$
  $1 - y^2 \geq 0$ logo $|y|^2 \leq 1$
  $1 - z^2 \geq 0$ logo $|z|^2 \leq 1$

  $$D(f) = \{(x, y, z) \in \mathbb{R}^3 / -1 \leq x, y, z \leq 1\}$$

- 5.b
  $x^2 + (y - 3)^2 + z^2 = 9$

  1. $z_1 = +\sqrt{x^2 + y^2 - 6y}$
  2. $z_2 = -\sqrt{x^2 + y^2 - 6y}$

  $x^2 + y^2 - 6y \geq 0$
  $D(z) = \{(x, y) \in \mathbb{R}^2, x^2 + y^2 \geq 6y\}$