

## Cálculo Diferencial e Integral 2 Respostas à Ficha de Trabalho 2

1. (a)  $\frac{\partial f}{\partial x} = \frac{1}{y}$ ;  $\frac{\partial f}{\partial y} = -\frac{x}{y^2}$ .  
(b)  $\frac{\partial g}{\partial x} = \frac{y}{2(1+xy)}$ ;  $\frac{\partial g}{\partial y} = \frac{x}{2(1+xy)}$ .  
(c)  $\frac{\partial h}{\partial x} = -\frac{4xy^2}{(x^2-y^2)^2}$ ;  $\frac{\partial h}{\partial y} = \frac{4yx^2}{(x^2-y^2)^2}$ .
2.  $\frac{\partial f}{\partial x}(0, 0) = 1$ ;  $\frac{\partial f}{\partial y}(0, 0) = 0$ .
3. (a)  $\begin{bmatrix} \frac{1}{y} & -\frac{x}{y^2} \\ y & x \end{bmatrix}$   
(b)  $\begin{bmatrix} 0 & \frac{1}{2} \frac{z}{\sqrt{yz}} & \frac{1}{2} \frac{y}{\sqrt{yz}} \\ yze^{xyz} & xze^{xyz} & xye^{xyz} \end{bmatrix}$   
(c)  $\begin{bmatrix} 2x & 0 & 0 \\ z & -1 & x \\ 0 & 0 & 4z^3 \end{bmatrix}$   
(d)  $[2x - yz \quad -xz \quad -xy + 4z^3]$   
(e)  $\begin{bmatrix} 2t \\ 2e^{2t} \\ -\frac{1}{t^2} \end{bmatrix}$
4. (a) 1  
(b)  $e$
5.  $(1, 1)$  por exemplo.
6. Apenas a função da alínea iii) é diferenciável na origem.
7. (a) 2  
(b)  $\frac{1}{2}$
8.  $\begin{bmatrix} 0 & 0 \\ 2 & -2 \end{bmatrix}$
9.  $2t$ .
10.  $-e^{-x-y} + 2ye^{2xy}$
11. 34

12.  $\begin{bmatrix} 0 \\ 2 \\ 4 \end{bmatrix}$

13.  $g'(x) = -\frac{\frac{\partial F}{\partial x}(x,g(x))}{\frac{\partial F}{\partial y}(x,g(x))}$

14. Recta tangente:  $\{(1, 0, 0) + t(0, 1, 1) : t \in \mathbb{R}\}$ ; Plano normal:  $y + z = 0$ .

15. Recta normal:  $\{(1, 0, 1) + t(1, 0, -1) : t \in \mathbb{R}\}$ ; Plano tangente:  $x - z = 0$ .