/ / LISTA 06 – CÁLCULO 02

Wanderson Faustino Patrico   Matrícula: 2022005052

QUESTÃO 01| a) $f_x = -3y$ e $f_y = 5y^4 - 3x$

b) $f_x = 4x^3y^3 + 16xy$ e $f_y = 3x^4y^2 + 8x^2$

c) $f_x = -\pi \cdot e^{-t} \cdot sen(\pi x)$ e $f_t = -e^{-t}\cos(\pi x)$

d) $f_x = \frac{\ln t}{2\sqrt{x}}$ e $f_y = \frac{\sqrt{x}}{t}$ e) $f_x = 20\cdot(2x+3y)^9$ e $f_y = 30\,(2x+3y)^9$

f) $f_x = sec^2(xy) = f_y$ g) $f_x = \frac{1}{y}$ e $f_y = -1/y^2$

h) $f_x = \frac{(x+y)^2 - x\cdot 2(x+y)}{(x+y)^4}$ e $f_y = -\frac{2x}{(x+y)^3}$

i) $f_x = \frac{a(cx+dy) - c\cdot(ax+by)}{(cx+dy)^2} \Rightarrow f_x = \frac{(ad-bc)y}{(cx+dy)^2}$

Analogamente $\Rightarrow f_y = \frac{(bc-ad)\cdot x}{(cx+dy)^2}$

l) $f_x = \frac{\sqrt{t}}{1+tx^2}$ e $f_t = \frac{x}{2\sqrt{t}(1+tx^2)}$ m) $W_\alpha = \cos\alpha\cdot\cos\beta$ e $W_\beta = -sen\alpha\ sen\beta$

n) $f_x = y\cdot x^{y-1}$ e $f_y = x^y\cdot \ln x$

Obs: $\frac{d}{dx}\int_a^x f(t)dt = f(x)$

o) $F_x = \cos(e^x)$ e $F_y = -\cos(e^x)$

r) $f_x = sen(y-x)$, $f_y = x\cdot\cos(y-z)$ e $f_z = -x\cdot\cos(y\cdot z)$

v) $u(x,y,z) = x^{y/z} \Rightarrow \frac{\partial u}{\partial x} = \frac{y}{z}\cdot x^{\frac{y}{z}-1}$

$u = e^{\ln x\cdot y/z} \Rightarrow \frac{\partial u}{\partial y} = x^{y/z}\cdot\frac{\ln x}{z}$ e $\frac{\partial u}{\partial z} = -\frac{1}{z^2}(\ln x)\cdot y\cdot x^{y/z}$

y) ~~f(x,y,z)~~ $u(x_1,\dots,x_n) = \sqrt{x_1^2+\dots+x_n^2} \Rightarrow \frac{\partial u}{\partial x_k} = \frac{1}{2\sqrt{u}}\cdot 2x_k$

$\Rightarrow \frac{\partial u}{\partial x_k} = \frac{x_k}{\sqrt{x_1^2+\dots+x_n^2}}$

z) $u(x_1,\dots,x_n) = sen(x_1+2x_2+\dots+n\cdot x_n)$

$\frac{\partial u}{\partial x_k} = \cos(x_1+2x_2+\dots+n\cdot x_n)\cdot k$

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Questão 02 | a) $f_x = 3x^2y^5 + 8x^3y$ e $f_y = 5x^2y^4 + 2x^4$

- $f_{xx} = 6xy^5 + 24x^2y$ e $f_{xy} = 15x^2y^4 + 8x^3$
- $f_{yy} = 20x^2y^3$ e $f_{yx} = 15x^2y^4 + 8x^3$

b) $f_x = m \cdot sen(2mx + 2ny)$ e $f_y = n \cdot sen(2mx + 2ny)$

- $f_{xx} = 2m^2 \cos(2mx + 2ny)$ e $f_{xy} = 2nm \cos(2mx + 2ny)$
- $f_{yy} = 2n^2 \cos(2mx + 2ny)$ e $f_{yx} = 2nm \cdot \cos(2mx + 2ny)$

c) $f_u = \frac{u}{\sqrt{u^2+v^2}}$ e $f_v = \frac{v}{\sqrt{u^2+v^2}}$

- $f_{uu} = \frac{\sqrt{u^2+v^2} - \frac{u^2}{\sqrt{u^2+v^2}}}{u^2+v^2} \Rightarrow f_{uu} = \frac{v^2}{(u^2+v^2)^{3/2}}$

$f_{vv} = \frac{u^2}{(u^2+v^2)^{3/2}}$

- $f_{uv} = f_{vu} = -\frac{1}{2} u \cdot (u^2+v^2)^{-3/2} \cdot 2v \Rightarrow f_{uv} = f_{vu} = -\frac{u \cdot v}{(u^2+v^2)^{3/2}}$

f) $f_x = e^{xe^y} \cdot e^y$ e $f_y = e^{xe^y} \cdot x \cdot e^y$

- $f_{xx} = e^{2y} \cdot e^{xe^y}$ e $f_{yy} = x^2 \cdot e^{2y} \cdot e^{xe^y} + x \cdot e^y \cdot e^{xe^y}$; $f_{xy} = x \cdot e^{2y} e^{xe^y} + e^y \cdot e^{xe^y} = f_{yx}$

Questão 03 | a) $f(x,y) = x^4y^3 - y^4$

$f_x = 4x^3y^3$ e $f_y = 3x^4y^2 - 4y^3$

$f_{xy} = 12x^3y^2$ e $f_{yx} = 12x^3y^2$ Logo: $f_{xy} = f_{yx}$

b) $f(x,y) = e^{xy} \, seny$

$f_x = e^{xy} \cdot seny$ e $f_y = e^{xy} \cdot seny + e^{xy} \cdot cosy$

$f_{xy} = e^{xy} seny + e^{xy} cosy$ e $f_{yx} = e^{xy} seny + e^{xy} cosy \Rightarrow f_{xy} = f_{yx}$

c) $f(x,y) = \cos(x^2y)$

$f_x = -2xy \cdot sen(x^2y)$ e $f_y = -x^2 \cdot sen(x^2y)$

$f_{xy} = -2x\,sen(x^2y) - 2x^3y\cos(x^2y)$ e $f_{yx} = -2x\,sen(x^2y) - 2x^3y\cos(x^2y) \Rightarrow f_{xy} = f_{yx}$

d) $f(x,y) = \ln(x+2y)$

$f_x = \frac{1}{x+2y}$ e $f_y = \frac{2}{x+2y}$

$f_{xy} = -\frac{2}{(x+2y)^2}$ e $f_{yx} = -\frac{2}{(x+2y)^2} \Rightarrow f_{xy} = f_{yx}$