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funções:

1) $F(x, y) = \frac{x}{x+y}$ em $(2, 1)$

2) $F(x, y) = \sqrt{x+e^{4y}}$ em $(3, 0)$

a) Para 1) -----

$$\frac{\partial F}{\partial x} = \frac{(x+y) - x}{(x+y)^2} = \frac{y}{(x+y)^2}$$

$$\frac{\partial}{\partial y} = \frac{(x+y) \cdot 0 - x}{(x+y)^2} = \frac{-x}{(x+y)^2}$$

----- Para 2) -----

$$\frac{\partial F}{\partial x} = \frac{1}{2\sqrt{x+e^{4y}}}$$

$$\frac{\partial F}{\partial y} = \frac{4e^{4y}}{2\sqrt{x+e^{4y}}} = \frac{2e^{4y}}{\sqrt{x+e^{4y}}}$$

b) Para 1) -----

$$x_0 = 2 \quad y_0 = 1 \quad z_0 = \frac{2}{3}$$

$$f_x(2, 1) = \frac{1}{(2+1)^2} = \frac{1}{9}$$

$$f_y(2, 1) = \frac{-2}{(2+1)^2} = -\frac{2}{9}$$

$$\Rightarrow L(x, y) = \frac{x}{9} - \frac{2y}{9} + \frac{2}{3}$$

Credeal

$$z - z_0 = f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0)$$

$$\Rightarrow z - \frac{2}{3} = \frac{1}{9}(x - 2) + \frac{2}{9}(y - 1)$$

$$z = \frac{1}{9}x - \frac{2}{9} - \frac{2}{9}y + \frac{2}{9} + \frac{2}{3}$$

$$z = \frac{x}{9} - \frac{2y}{9} + \frac{2}{3}$$

Para 2) -----

$$x_0 = 3 \quad y_0 = 0 \quad z_0 = 2$$

$$f_x(3, 0) = \frac{1}{2\sqrt{3+1}} = \frac{1}{4}$$

$$f_y(3, 0) = \frac{2 \cdot 1}{\sqrt{3+1}} = 1$$

$$z - z_0 = f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0)$$

$$\Rightarrow z - 2 = \frac{1}{4}(x - 3) + 1(y - 0)$$

$$\Rightarrow z = \frac{1}{4}x - \frac{3}{4} + y + 2$$

$$\Rightarrow z = \frac{x}{4} + y + \frac{5}{4}$$

c) As linearizações de 1) e 2) são:

$$L(x, y) = \frac{x}{9} - \frac{2y}{9} + \frac{2}{3}$$

e:

$$L(x, y) = \frac{x}{4} + y + \frac{5}{4}$$