

$$e) \vec{\nabla} f(x,y) = \begin{bmatrix} F_x & F_y \end{bmatrix}^t$$

$$F_x(2, -\frac{5}{2}) = \frac{2x}{2\sqrt{x^2 - 2y}} = \frac{2 \cdot 2}{2\sqrt{2^2 - 2(-\frac{5}{2})}} = \frac{2}{\sqrt{4+5}}$$

$$F_x = \frac{2}{3}$$

$$F_y(2, -\frac{5}{2}) = \frac{-1 \cdot (-2)}{2\sqrt{x^2 - 2y}} = \frac{-1}{\sqrt{4+5}} = \frac{-1}{\sqrt{9}}$$

$$F_y = \frac{-1}{3}$$

$$\vec{\nabla} f(x,y) = \begin{bmatrix} \frac{2}{3} & \frac{-1}{3} \end{bmatrix}^t$$

$$d) \text{Valor máximo} = \|\vec{\nabla} f(x,y)\|$$

$$\begin{aligned} \|\vec{\nabla} f(x,y)\| &= \sqrt{\left(\frac{2}{3}\right)^2 + \left(-\frac{1}{3}\right)^2} \\ &= \sqrt{\frac{4}{9} + \frac{1}{9}} \\ &= \sqrt{\frac{5}{9}} \end{aligned}$$

$$\|\vec{\nabla} f(x,y)\| = \frac{1}{3} \sqrt{5}$$

$$g) V_{1g} \cdot \vec{\nabla} f(x,y) = 0$$

$$\begin{bmatrix} 1 & 2 \end{bmatrix}^t \cdot \begin{bmatrix} 2/3 \\ -1/3 \end{bmatrix} = 0$$

$$\frac{2}{3} - \frac{2}{3} = 0$$

$$0 = 0(V)$$

Produto escalar entre os vetores igualou a 0

Portanto eles são ortogonais