e-) $\vec{\nabla} f(x,y) = [F_x \quad F_y]^t$

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

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

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

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

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

$$\| \vec{\nabla} f(x,y) \| = \sqrt{\left(\frac{2}{3}\right)^2 + \left(-1/3\right)^2}$$

$$= \sqrt{\frac{4}{9} + \frac{1}{9}}$$

$$= \sqrt{5/9}$$

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

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