

## Ficha de trabalho 2

1)  $f(x, y) = xy^2 - 3x^3y$

$P = (1, 1)$

$\vec{N} = (-1, 2) \quad \vec{N} = -\vec{i} + 2\vec{j}$

$\vec{u} = \frac{\vec{N}}{\|\vec{N}\|} = \left( \frac{-1}{\sqrt{5}}, \frac{2}{\sqrt{5}} \right) = \left( -\frac{\sqrt{5}}{5}, \frac{2\sqrt{5}}{5} \right)$

$\|\vec{N}\| = \sqrt{(-1)^2 + (2)^2} = \sqrt{5}$

$D_{\vec{u}} f(1, 1) = \frac{\partial f}{\partial x}(1, 1) \cdot \left( -\frac{\sqrt{5}}{5} \right) + \frac{\partial f}{\partial y}(1, 1) \cdot \left( \frac{2\sqrt{5}}{5} \right)$

$D_{\vec{u}} f(1, 1) = \left( y^2 - 9x^2y \right)_{(1, 1)} \cdot \left( -\frac{\sqrt{5}}{5} \right) + \left( 2xy - 3x^3 \right)_{(1, 1)} \cdot \left( \frac{2\sqrt{5}}{5} \right)$

$(1 - 9) \cdot \left( -\frac{\sqrt{5}}{5} \right) + (-1) \cdot \frac{2\sqrt{5}}{5}$

$\frac{8\sqrt{5}}{5} - \frac{2\sqrt{5}}{5} = \frac{6\sqrt{5}}{5}$

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

$P = (1, 2)$

$\vec{\nabla} f(x, y) = \left( \frac{\partial f}{\partial x}(x, y), \frac{\partial f}{\partial y}(x, y) \right)$

$\vec{\nabla} f(x, y) = \left( \frac{y}{x}, (\ln(x) + 2y) \right)$

$\vec{\nabla} f(x, y) = \left( \frac{y}{x}, \ln(x) + 2y \right)$