

Exercice n° 1 : $f(x) = x^3 + 1$ et $g(x) = \sin(x)$

1. $(g \circ f)'(x) = (g' \circ f)(x) \times f'(x) = \cos(x^3 + 1) \times 3x^2 = 3x^2 \cos(x^3 + 1)$
2. $(f \circ g)'(x) = (f' \circ g)(x) \times g'(x) = 3 \sin(x)^2 \times \cos(x)$

Exercice n° 2 : $\ell(x, y) = \sqrt{x^2 - y^2}$

1. $\frac{\partial \ell}{\partial x}(x, y) = \frac{x}{\sqrt{x^2 - y^2}}$
2. $\frac{\partial \ell}{\partial y}(x, y) = \frac{-y}{\sqrt{x^2 - y^2}}$

Exercice n° 3 : Soient $T = x^3 - xy + y^2$ où $x = r \cos(\theta)$ et $y = r \sin(\theta)$. En utilisant la formule de dérivation partielle des fonctions composées, calcule :

$$\frac{\partial T}{\partial r} = \frac{\partial T}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial T}{\partial y} \frac{\partial y}{\partial r} = (3x^2 - y) \cos(\theta) + (-x + 2y) \sin(\theta)$$