

Answer on Question #52228 – Math – Multivariable Calculus

If $f(x, y) = 4x^3 - 3y^2$, find f_x

Solution

Let's compute the partial derivative of function $f(x, y) = 4x^3 - 3y^2$ with respect to x , with y held constant:

$$f_x = \frac{\partial f}{\partial x} = \frac{\partial}{\partial x}(4x^3 - 3y^2) = \frac{\partial}{\partial x}(4x^3) + \frac{\partial}{\partial x}(-3y^2) = 4 \cdot 3x^2 + 0 = 12x^2$$

$$f_x = \frac{\partial f}{\partial x} = 12x^2.$$

The rules work the same way here as it does with functions of one variable:

$$\frac{\partial}{\partial x}(g(x, y) - h(x, y)) = \frac{\partial g(x, y)}{\partial x} - \frac{\partial h(x, y)}{\partial x};$$

$$\frac{\partial}{\partial x}(Ar(x)) = A \frac{\partial r(x)}{\partial x}, \text{ where } A \text{ is constant with respect to } x;$$

$$\frac{\partial}{\partial x}(x^n) = nx^{n-1}, \text{ where } n \text{ is integer.}$$

$$\frac{\partial}{\partial x}(s(y)) = 0, \text{ where } s(y) \text{ is function of } y.$$

Answer: $f_x = 12x^2$.