Answer on Question #52224 - Math - Multivariable Calculus

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

Solution:

Let's compute the partial derivative of function f(x,y) with respect to x, with y held constant:

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

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

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

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

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

Answer: $12x^2$.