Answer on Question #54867 – Math – Calculus

Question

If $f(x,y) = x^3y^2 - sin^2(x)cos(2y)$, what is $\frac{\partial f}{\partial y}$?

Solution

Take a partial derivative.

Use the subtraction rule: $\frac{\partial(f_1-f_2)}{\partial y} = \frac{\partial f_1}{\partial y} - \frac{\partial f_2}{\partial y}$.

$$\frac{\partial f}{\partial y} = \frac{\partial f(x,y)}{\partial y} = \frac{\partial(x^3y^2 - sin^2(x)cos(2y))}{\partial y} = \frac{\partial(x^3y^2)}{\partial y} - \frac{\partial(\sin^2(x)\cos(2y))}{\partial y}$$

Use the constant factor rule: $\frac{\partial(cf)}{\partial y} = c\frac{\partial f}{\partial y}, c\ is$ a constant.

Note: regarding differentiation with respect to y, variable x is a constant.

$$\frac{\partial(x^3y^2)}{\partial y} - \frac{\partial(\sin^2(x)\cos(2y))}{\partial y} = x^3\frac{\partial(y^2)}{\partial y} - \sin^2(x)\frac{\partial\big(cos(2y)\big)}{\partial y}$$

Use the rules of differentiation: $\frac{dy^n}{dy} = ny^{n-1}, n \neq 0$; $\frac{d(\cos(y))}{dy} = -\sin(y)$; $\frac{df(g(y))}{dy} = \frac{df}{dg}\frac{dg}{dy}$.

$$x^3\frac{\partial(y^2)}{\partial y} - \sin^2(x)\frac{\partial\big(cos(2y)\big)}{\partial y} = x^3 * 2y - \sin^2(x) * (-\sin(2y)) * 2 =$$

$=2yx^3 + 2\sin^2(x)\sin(2y)$.

Answer: $2yx^3 + 2\sin^2(x)\sin(2y)$.