Answer on Question #52222 – Math - Multivariable Calculus

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

Solution

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

$$\frac{\partial f}{\partial x}=\frac{\partial}{\partial x}\left(\sin(2x)\cdot\cos y+xy^2\right)=\cos y\frac{\partial}{\partial x}\left(\sin 2x\right)+y^2\frac{\partial(x)}{\partial x}=\cos y\left(\frac{\partial}{\partial z}\sin z\Big|_{z=2x}\right)\cdot\left(\frac{\partial z}{\partial x}\Big|_{z=2x}\right)+y^2=$$

$$=\cos y\cdot\cos(2x)\cdot 2+y^2=2\cos 2x\cdot\cos y+y^2.$$

Here function $\sin 2x$ is composite, besides, $\frac{\partial(\sin z)}{\partial z}=(\sin z)'_z=\cos(z)$, $\frac{\partial(2x)}{\partial x}=(2x)'_x=2$.

Answer: $\frac{\partial f}{\partial x}=2\cos 2x\cos y+y^2.$