Answer on Question #55095 – Math – Calculus

suppose f(x,y) = sin^2xcosy + xy^2, what is df/dx ?

Solution

$$\frac{df}{dx} = \frac{\partial f}{\partial x} \cdot \frac{dx}{dx} + \frac{\partial f}{\partial y} \cdot \frac{dy}{dx} = \frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} \cdot \frac{dy}{dx}$$

$$\frac{\partial f}{\partial x} = (\sin^2 x \cdot \cos y + x \cdot y^2)'_x = (sin^2 x)'_x \cdot \cos y + sin^2 x \cdot (\cos y)'_x + x'_x \cdot y^2 + x \cdot (y^2)'_x =$$

$$= 2 \cdot \sin x \cdot \cos x \cdot \cos y + y^2$$

$$\frac{\partial f}{\partial y} = (\sin^2 x \cdot \cos y + x \cdot y^2)'_y = (sin^2 x)'_y \cdot \cos y + sin^2 x \cdot (\cos y)'_y + x'_y \cdot y^2 + x \cdot (y^2)'_y =$$

$$= -sin^2 x \cdot \sin y + 2xy$$

$$\frac{df}{dx} = (2 \cdot sin\, x \cdot cos\, x \cdot cos\, y + y^2) - (sin^2 x \cdot \sin y - 2xy)\, \frac{dy}{dx} = \sin 2x \cdot \cos y + y^2 -$$

$$-sin^2 x \cdot \sin y \cdot y' + 2xyy'$$

Answer: $\sin 2x \cdot \cos y + y^2 — sin^2 x \cdot \sin y \cdot y' + 2xyy'$