

partial derivatives.

$$\lim_{h \rightarrow 0} \frac{f(x+h, y) - f(x, y)}{h} = \frac{\partial f}{\partial x} = f_x$$

$f(x, y) = 2xy$. Find f_x $\frac{\partial(2xy)}{\partial x} = 2y$

$$\lim_{h \rightarrow 0} \frac{f(x+h, y) - f(x, y)}{h}$$

$$\lim_{h \rightarrow 0} \frac{2(x+h)y - 2xy}{h}$$

$$\lim_{h \rightarrow 0} \frac{\cancel{2xy} + 2hy - \cancel{2xy}}{h} = 2y$$

Find $\frac{\partial f}{\partial x}$ & $\frac{\partial f}{\partial y}$

1) $f = 2x^2y$

$$\frac{\partial f}{\partial x} = 2y(x^2)' \rightarrow 4xy$$

$$\frac{\partial f}{\partial y} = 2x^2$$

2) $f = \ln(xy + x^2)$

$$\frac{1(2x+y)}{xy + x^2}$$

$$\frac{x}{xy + x^2}$$

3) $f = e^{xy}$

$$ye^{xy}$$

$$xe^{xy}$$

$$z = x^2 + 3y$$

$$\frac{\partial z}{\partial x} = 2x$$

$$\frac{\partial z}{\partial y} = 3$$

	f_x	f_y
1) $f(x,y) = \sin(x+2y^2)$	$\cos(x+2y^2)$	$4y \cos(x+2y^2)$
2) $f(x,y) = \frac{2xy}{x^2+y^2}$	$\frac{2y(x^2+y^2) - 2xy(2x)}{(x^2+y^2)^2}$	$\frac{2x(x^2+y^2) - 2xy(2y)}{(x^2+y^2)^2}$
3) $f(x,y) = e^{xy^2} (\ln(x^2+y^2))$	$y^2 e^{xy^2} \ln(x^2+y^2)$ $+ e^{xy^2} \frac{2x}{x^2+y^2}$	$x \cdot 2y e^{xy^2} \ln(x^2+y^2)$ $+ e^{xy^2} \frac{2y}{(x^2+y^2)}$