Partial derivatives

$f(x)$ $\quad \frac{df(x)}{dx}$ tells us how $f(x)$ changes as x changes

$$= \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$f(x,y,z)$ $\quad \frac{\partial f(x,y,z)}{\partial x}$, $\frac{\partial f(x,y,z)}{\partial y}$, $\frac{\partial f(x,y,z)}{\partial z}$

$\frac{\partial f}{\partial x}$ tells us how f changes as x changes, when y, z are kept fixed.

"partial" dee

$$\frac{\partial f(x,y,z)}{\partial x} = \lim_{\Delta x \to 0} \frac{f(x+\Delta x, y, z) - f(x,y,z)}{\Delta x}$$

$f(x,y,z) = xyz \quad \frac{\partial f}{\partial x} = yz$

$f(x,y,z) = x^2 + y^2 + z^2 \quad \frac{\partial f}{\partial x} = 2x$

Fuller notation $\quad \frac{\partial f(x,y,z)}{\partial x}\Big|_{y,z}$ ← reminds you to hold y, z fixed