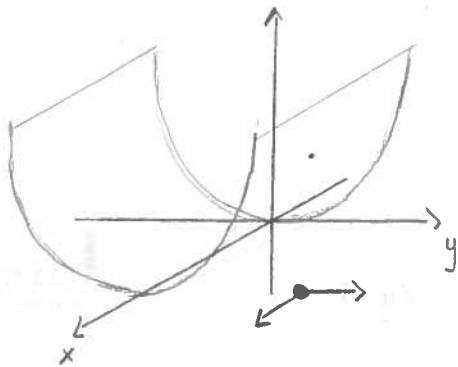


REPETITION 17/01

Directional derivative : $f'(a; r) := \lim_{h \rightarrow 0} \frac{f(a+hr) - f(a)}{h}$

Partial derivative : $\frac{\partial f}{\partial x_i}(a) := f'(a; e_i)$



$$f(x, y) = y^2$$

$$\bullet \frac{\partial f}{\partial x}(x, y) = 0$$

$$\bullet \frac{\partial f}{\partial y}(x, y) = 2y$$

Gradient of f : $\nabla f(a) = \left(\frac{\partial f}{\partial x_1}(a), \dots, \frac{\partial f}{\partial x_n}(a) \right)$

Definition

f differentiable in $a \iff$

$\bullet \nabla f(a)$ exists

$$\bullet \lim_{r \rightarrow 0} \frac{f(a+r) - f(a) - \nabla f(a) \cdot r}{\|r\|} = 0$$