Formulas-2

 $\lim_{(x,y) o(x_0,y_0)}f(x,y)=L$ if for every ϵ >0, there exists a corresponding δ >0, such that for all (x,y) in the domain of f, $|f(x,y)-L|<\epsilon$ whenever $0<\sqrt{(x-x_0)^2+(y-y_0)^2}<\delta$

$$rac{\partial f}{\partial x}|_{(x_0,y_0)} = \lim_{h o 0} rac{f\left(x_0+h,y_0
ight)-f\left(x_0,y_0
ight)}{h} = f_x\left(x_0,y_0
ight)$$

$$egin{align*} f_{xx} &= rac{\partial^2 f}{\partial x^2} = rac{\partial}{\partial x} \left(rac{\partial f}{\partial x}
ight) \ f_{yy} &= rac{\partial^2 f}{\partial y^2} = rac{\partial}{\partial y} \left(rac{\partial f}{\partial y}
ight) \ f_{xy} &= rac{\partial^2 f}{\partial yx} = rac{\partial}{\partial y} \left(rac{\partial f}{\partial x}
ight) \ f_{yx} &= rac{\partial^2 f}{\partial xy} = rac{\partial}{\partial x} \left(rac{\partial f}{\partial y}
ight) \ rac{dw}{dt} &= rac{\partial w}{\partial x} \cdot rac{dx}{dt} + rac{\partial w}{\partial y} \cdot rac{dy}{dt} + rac{\partial w}{\partial z} \cdot rac{dz}{dt} \ rac{dy}{dx} &= -rac{F_x}{F_{xy}} \end{split}$$

$$egin{aligned} f_u'\left(x,y
ight) &= D_u f\left(x,y
ight) = \lim_{s o 0} rac{f\left(x+su_1,y+su_2
ight) - f\left(x,y
ight)}{s} =
abla ext{ f}\left(x,y
ight) \cdot u \ \\ &
abla f\left(x,y,z
ight) = rac{\partial f}{\partial x} i + rac{\partial f}{\partial y} j + rac{\partial f}{\partial z} k \end{aligned}$$

Tangent line to a level curve: $f_{x}\left(x-x_{0}
ight)+f_{y}\left(y-y_{0}
ight)=0$

$$rac{d}{dt}(f(r(t)) =
abla ext{ f}(r(t)) ullet ext{ } r'(t)$$