Mathematical Excursus

Examples of functions with 1 variable

Function	**First Derivative**

$f(x) = x^4$ $f'(x) =$ 4x^3

$g(x) = x^3 + 5 \cdot x^2 + 7$ $g'(x) =$ 3x^2 + 10x

$h(x) = \sqrt{x} = x^{\frac{1}{2}}$ $h'(x) =$ 1/2x^-0,5 = 1/2 * 1/x^1/2 = 1/ (2* Wurzel X)

Examples of functions with 2 variables

Function   **Partial Derivatives**

imagine : other variable is a constant
(e.g. 1 or 10)
bei multiplizieren immer variable (wie konstante mitnehmen)

	with respect to x_1	with respect to x_2

$f(x_1; x_2) = x_1^2 + x_2^4$ $\dfrac{\partial f}{\partial x_1}(x_1; x_2) =$ 2x $\dfrac{\partial f}{\partial x_2}(x_1; x_2) =$ 4x^3

with respect to x_A with respect to x_B

$g(x_A; x_B) = x_A^3 \cdot x_B$ $\dfrac{\partial g}{\partial x_A}(x_A; x_B) =$ 3xa^2 * xb $\dfrac{\partial g}{\partial x_B}(x_A; x_B) =$ 1 * xa^3

with respect to x with respect to y

$h(x; y) = x + 5 \cdot \sqrt{y}$ $\dfrac{\partial h}{\partial x}(x; y) =$ 1 $\dfrac{\partial h}{\partial y}(x; y) =$ 5 * 1/2 * y^(-1/2)

with respect to x_1 with respect to x_2

$k(x_1; x_2) = x_1^{0.4} \cdot x_2^{0.6}$ $\dfrac{\partial k}{\partial x_1}(x_1; x_2) =$ 0,4x^(-0,6) * x^0,6 $\dfrac{\partial k}{\partial x_2}(x_1; x_2) =$ 0,6x^(-0,4) * x^0,4

= 0,4 (x2^0,6/x^0,6)
= 0,4 (x2/x1)^0.6

auf punkte achten --> 0.6 statt 0,6