

1 Introduction

CrInGeCrInGeProduction.Supercringeintroductionhere :

Let’s calculate smth with a given function: $f(x, y) = \sin x \cdot y^{2.000}$
Firstly, let’s insert all constants and simplify this expression: $f(x, y) = \sin x \cdot y^{2.000}$

2 Exploration the expression as a function of multiple variables

Calculation value of function in the point BRITISH SCIENTISTS WERE SHOCKED, WHEN THEY COUNT IT!!!

In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = 0.564
Personally, I’ve always thought about first derivation of something like that function... Haven’t you?
But now, by using informatics and math skills I feel that I’m prepared enough to calculate it!
1 step. finding a derivation of:

y
While preparing for exams, I learned a lot of new things, for example:
 $(y)' = \dots = [\text{top secret}] = \dots =$
= 1.000

2 step. finding a derivation of:
 $y^{2.000}$
It’s really easy to find:
 $(y^{2.000})' = \dots = [\text{top secret}] = \dots =$
= $2.000 \cdot y$

3 step. finding a derivation of:
 x
My roommate mumbled it in his sleep all night:
 $(x)' = \dots = [\text{top secret}] = \dots =$
= 1.000

4 step. finding a derivation of:
 $\sin x$
Sounds logical that it is the same as:
 $(\sin x)' = \dots = [\text{top secret}] = \dots =$
= $\cos x$

5 step. finding a derivation of:
 $\sin x \cdot y^{2.000}$
For centuries, people have hunted for the secret knowledge that:
 $(\sin x \cdot y^{2.000})' = \dots = [\text{top secret}] = \dots =$
= $\cos x \cdot y^{2.000} + 2.000 \cdot y \cdot \sin x$
Congratulations! **The first derivation of the expression** is:
 $\cos x \cdot y^{2.000} + 2.000 \cdot y \cdot \sin x$ In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = -3.395

Let’s calculate the 0 derivation of the expression:
Finally... The 0 derivation of the expression:
 $\sin x \cdot y^{2.000}$

BRITISH SCIENTISTS WERE SHOCKED AGAIN, WHEN THEY COUNT THE 0 DERIVATION OF THIS EXPRESSION!!!
In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = 0.564
Partial derivation of the expression on the variable x:
 $\frac{\partial f}{\partial x} = 4.000 \cdot \cos x$
In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = -3.959970 !!!
Partial derivation of the expression on the variable y:
 $\frac{\partial f}{\partial y} = 0.141 \cdot 2.000 \cdot y$
In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = 0.564480 !!!
Full derivation:
 $\sqrt{(4.000 \cdot \cos x)^{2.000} + (0.141 \cdot 2.000 \cdot y)^{2.000}}$
In the point $M_0(x_0, y_0) = (3.000, 2.000)$ it’s value = 4.000 !!!

3 Exploration the function of the first variable

Now let’s consider the expression as a function of x variable: $f(x) = 4.000 \cdot \sin x$
Maklorens formula for $x \rightarrow x_0 = 3.000$:
 $f(x) = 0.564 + (-3.960) \cdot (x - 3.000) + (-0.282) \cdot (x - 3.000)^{2.000} + 0.660 \cdot (x - 3.000)^{3.000} + 0.024 \cdot (x - 3.000)^{4.000} + (-0.033) \cdot (x - 3.000)^{5.000} + o((x - 3.000)^6)$
Graph $f(x) = 4.000 \cdot \sin x$ on the diapasone $x \in [-10 : 10]$:

Tangent equation in the point $x_0 = 0.000$:

$$f(x) = 4.000 \cdot x$$

Normal equation in the point $x_0 = 0.000$:

$$f(x) = (-0.250) \cdot x$$