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:

$(y)' = ... =$ [top secret] $= ... =$

$= 1.000$

2 step. finding a derivation of:

$y^{2.000}$

It's really easy to find:

$(y^{2.000})' = ... =$ [top secret] $= ... =$

$= 2.000 \cdot y$

3 step. finding a derivation of:

x

My roommate mumbled it in his sleep all night:

$(x)' = ... =$ [top secret] $= ... =$

$= 1.000$

4 step. finding a derivation of:

$\sin x$

Sounds logical that it is the same as:

$(\sin x)' = ... =$ [top secret] $= ... =$

$= \cos x$

5 step. finding a derivation of:

$\sin x \cdot y^{2.000}$

For centuries, people have hunted for the secret knowledge that:

$(\sin x \cdot y^{2.000})' = ... =$ [top secret] $= ... =$

$= \cos x \cdot y^{2.000} + 2.000 \cdot y \cdot \sin x$

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

Finding the 0 derivation: 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

Finding partical derivations: 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 !!!

Finding full derivation: 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 $x \to x_0 = 3.000$:

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

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) = $(-0.250) \cdot x$