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: $f(x, y) = \sin x \cdot y^{2.000}$

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:

$(y)' = ... = [\text{top secret}] = ... =$

$= 1.000$

2 step. finding a derivation of:

$y^{2.000}$

It's really easy to find:

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

$= 2.000 \cdot y$

3 step. finding a derivation of:

x

My roommate mumbled it in his sleep all night:

$(x)' = ... = [\text{top secret}] = ... =$

$= 1.000$

4 step. finding a derivation of:

$\sin x$

Sounds logical that it is the same as:

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

$= \cos x$

5 step. finding a derivation of:

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

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

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

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

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

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 !!!

Now let's consider the expression as a function of x variable: $f(x) = 4.000 \cdot \sin x$

Maklorens formula for $x \to x_0 = 3.000$:

$f(x) = 0.564 + (-3.960) \cdot (x - 3.000) + (-0.282) \cdot (x - 3.000)^{2.000} + 0.660 \cdot (x - 3.000)^{3.000} + 0.024 \cdot (x - 3.000)^{4.000} + o((x - 3.000)^{4.000})$

Graph f(x):

Tangent equation in the point $x_0 = 0.000$: $f(x) = 4.000 \cdot x$
Normal equation in the point $x_0 = 0.000$: $f(x) = (-0.250) \cdot (x - 0.000) + 0.000$