1 Introduction

$CrInGeCrInGeProduction.Supercringeintroductionhere:$

2 Some basic knowledge about researching problem...

Let's calculate smth with a given function: f(x, opa) $= \ln(1.000 + x \cdot opa)$

And let's also introduce some parameters and constants we use in this work:

List of used constants and variables:

Firstly, let's simplify this expression (if possible): f(x, opa) $= \ln(1.000 + x \cdot opa)$

3 Exploration of 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 $M_0(x_0, opa_0) = (1.000, 13.000)$ **it's value** $= 2.63906$

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 opa

When I was child, my father always told me: "Remember, son:

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

$= 1.000$

`2 step:` Finding a derivation of x

thanks to the results of my colleagues' scientific work, I know that:

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

$= 1.000$

`3 step:` Finding a derivation of $x \cdot opa$

What if:

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

$= opa + x$

`4 step:` Finding a derivation of 1.000

If someone asked me that in the middle of the night, I wouldn't hesitate to say:

$(1.000)' = ... =$ [top secret] $= ... =$

$= 0.000$

`5 step:` Finding a derivation of $1.000 + x \cdot opa$

It's really easy to find:

$(1.000 + x \cdot opa)' = ... =$ [top secret] $= ... =$

$= opa + x$

`6 step:` Finding a derivation of $\ln(1.000 + x \cdot opa)$

My friends always beat me, because I didn't know that:

$(\ln(1.000 + x \cdot opa))' = ... =$ [top secret] $= ... =$

$= \frac{1.000}{1.000+x\cdot opa} \cdot (opa + x)$

Congratulations! **The first derivation of the expression** is:

$f'(x, opa) = \frac{1.000}{1.000+x\cdot opa} \cdot (opa + x)$

In the point $M_0(x_0, opa_0) = (1.000, 13.000)$ it's value $= 1.00000$

Finding the 3 derivation Let's find **the 1 derivation** of the expression:

`1 step:` Finding a derivation of opa

Sounds logical that it is the same as:

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

$= 1.000$

`2 step:` Finding a derivation of x

My roommate mumbled it in his sleep all night:

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

$= 1.000$

`3 step:` Finding a derivation of $x \cdot opa$

What if:

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

$= opa + x$

`4 step:` Finding a derivation of 1.000

While preparing for exams, I learned a lot of new things, for example:

$(1.000)' = ... =$ [top secret] $= ... =$

$= 0.000$

`5 step:` Finding a derivation of $1.000 + x \cdot opa$

Sounds logical that it is the same as:

$(1.000 + x \cdot opa)' = ... =$ [top secret] $= ... =$

$= opa + x$

`6 step:` Finding a derivation of $\ln(1.000 + x \cdot opa)$

I was asked not to tell anyone that:

$(\ln(1.000 + x \cdot opa))' = ... =$ [top secret] $= ... =$

$= \frac{1.000}{1.000+x\cdot opa} \cdot (opa + x)$

Let's find **the 2 derivation** of the expression:

`1 step:` Finding a derivation of x

Even my two-aged sister knows that:

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

$= 1.000$

`2 step:` Finding a derivation of opa

I was asked not to tell anyone that:

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

$= 1.000$

`3 step:` Finding a derivation of $opa + x$

If someone asked me that in the middle of the night, I wouldn't hesitate to say:

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

$= 2.000$

`4 step:` Finding a derivation of opa

thanks to the results of my colleagues' scientific work, I know that:

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

$= 1.000$

`5 step:` Finding a derivation of x

My roommate mumbled it in his sleep all night:

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

$= 1.000$

`6 step:` Finding a derivation of $x \cdot opa$

Even my two-aged sister knows that:

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

$= opa + x$

`7 step:` Finding a derivation of 1.000

Man... Just look:

$(1.000)' = ... =$ [top secret] $= ... =$

$= 0.000$

`8 step:` Finding a derivation of $1.000 + x \cdot opa$

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

$(1.000 + x \cdot opa)' = ... =$ [top secret] $= ... =$

$= opa + x$

`9 step:` Finding a derivation of 1.000

I was asked not to tell anyone that:

$(1.000)' = ... =$ [top secret] $= ... =$

$= 0.000$

`10 step:` Finding a derivation of $\frac{1.000}{1.000+x\cdot opa}$

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

$(\frac{1.000}{1.000+x\cdot opa})' = ... =$ [top secret] $= ... =$

$= \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$

`11 step:` Finding a derivation of $\frac{1.000}{1.000+x\cdot opa} \cdot (opa + x)$

When I was child, my father always told me: "Remember, son:

$(\frac{1.000}{1.000+x\cdot opa} \cdot (opa + x))' = ... =$ [top secret] $= ... =$

$= \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x\cdot opa}$

Let's find **the 3 derivation** of the expression:

`1 step:` Finding a derivation of opa

While preparing for exams, I learned a lot of new things, for example:

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

$= 1.000$

`2 step:` Finding a derivation of x

thanks to the results of my colleagues' scientific work, I know that:

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

$= 1.000$

`3 step:` Finding a derivation of $x \cdot opa$

Sounds logical that it is the same as:

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

$= opa + x$

`4 step:` Finding a derivation of 1.000

A true prince must know that:

$(1.000)' = ... =$ [top secret] $= ... =$

$= 0.000$

`5 step:` Finding a derivation of $1.000 + x \cdot opa$

If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(1.000 + x \cdot opa)' = ... = [\text{top secret}] = ... =$
$= opa + x$
`6 step:` Finding a derivation of 1.000
If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`7 step:` Finding a derivation of $\frac{1.000}{1.000+x\cdot opa}$
My friends always beat me, because I didn't know that:
$(\frac{1.000}{1.000+x\cdot opa})' = ... = [\text{top secret}] = ... =$
$= \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
`8 step:` Finding a derivation of 2.000
What if:
$(2.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`9 step:` Finding a derivation of $2.000 \cdot \frac{1.000}{1.000+x\cdot opa}$
Sounds logical that it is the same as:
$(2.000 \cdot \frac{1.000}{1.000+x\cdot opa})' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
`10 step:` Finding a derivation of x
thanks to the results of my colleagues' scientific work, I know that:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`11 step:` Finding a derivation of opa
Even my two-aged sister knows that:
$(opa)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`12 step:` Finding a derivation of $opa + x$
While preparing for exams, I learned a lot of new things, for example:
$(opa + x)' = ... = [\text{top secret}] = ... =$
$= 2.000$
`13 step:` Finding a derivation of opa
When I was child, my father always told me: "Remember, son:
$(opa)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`14 step:` Finding a derivation of x
It's really easy to find:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`15 step:` Finding a derivation of $x \cdot opa$
For centuries, people have hunted for the secret knowledge that:
$(x \cdot opa)' = ... = [\text{top secret}] = ... =$
$= opa + x$
`16 step:` Finding a derivation of 1.000
If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`17 step:` Finding a derivation of $1.000 + x \cdot opa$
Sounds logical that it is the same as:
$(1.000 + x \cdot opa)' = ... = [\text{top secret}] = ... =$
$= opa + x$
`18 step:` Finding a derivation of $(1.000 + x \cdot opa)^{2.000}$
I spend the hole of my life to find the answer and finally it's:
$((1.000 + x \cdot opa)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot (1.000 + x \cdot opa) \cdot (opa + x)$
`19 step:` Finding a derivation of x
While preparing for exams, I learned a lot of new things, for example:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`20 step:` Finding a derivation of opa
I spend the hole of my life to find the answer and finally it's:
$(opa)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`21 step:` Finding a derivation of $opa + x$
When I was child, my father always told me: "Remember, son:
$(opa + x)' = ... = [\text{top secret}] = ... =$
$= 2.000$
`22 step:` Finding a derivation of -1.000
For centuries, people have hunted for the secret knowledge that:
$(-1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`23 step:` Finding a derivation of $(-1.000) \cdot (opa + x)$
What if:
$((-1.000) \cdot (opa + x))' = ... = [\text{top secret}] = ... =$
$= -2.000$
`24 step:` Finding a derivation of $\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
A true prince must know that:
$(\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}})' = ... = [\text{top secret}] = ... =$
$= \frac{(-2.000)\cdot(1.000+x\cdot opa)^{2.000}-2.000\cdot(1.000+x\cdot opa)\cdot(opa+x)\cdot(-1.000)\cdot(opa+x)}{((1.000+x\cdot opa)^{2.000})^{2.000}}$
`25 step:` Finding a derivation of $\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} \cdot (opa + x)$
Man... Just look:
$(\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} \cdot (opa + x))' = ... = [\text{top secret}] = ... =$
$= \frac{(-2.000)\cdot(1.000+x\cdot opa)^{2.000}-2.000\cdot(1.000+x\cdot opa)\cdot(opa+x)\cdot(-1.000)\cdot(opa+x)}{((1.000+x\cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
`26 step:` Finding a derivation of $\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x\cdot opa}$
I was asked not to tell anyone that:
$(\frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x\cdot opa})' = ... = [\text{top secret}] = ... =$
$= \frac{(-2.000)\cdot(1.000+x\cdot opa)^{2.000}-2.000\cdot(1.000+x\cdot opa)\cdot(opa+x)\cdot(-1.000)\cdot(opa+x)}{((1.000+x\cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} + 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
Finally... The 3 derivation of the expression:
$f^{(3)}(\text{x, opa}) = \frac{(-2.000)\cdot(1.000+x\cdot opa)^{2.000}-2.000\cdot(1.000+x\cdot opa)\cdot(opa+x)\cdot(-1.000)\cdot(opa+x)}{((1.000+x\cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}} + 2.000 \cdot \frac{(-1.000)\cdot(opa+x)}{(1.000+x\cdot opa)^{2.000}}$
BRITISH SCIENTISTS WERE SHOCKED AGAIN, WHEN THEY COUNT THE 3 DERIVATION OF THIS EXPRESSION!!!
In the point $M_0(x_0, opa_0) = (1.000, 13.000)$ it's value = 1.57143

Finding partical derivations Partial derivation of the expression on the variable x:
$\frac{\partial f}{\partial x} = 13.000 \cdot \frac{1.000}{1.000+13.000\cdot x}$
In the point $M_0(x_0, opa_0) = (1.000, 13.000)$ it's value = 0.92857 !!!
Partial derivation of the expression on the variable opa:
$\frac{\partial f}{\partial opa} = \frac{1.000}{1.000+opa}$
In the point $M_0(x_0, opa_0) = (1.000, 13.000)$ it's value = 0.07143 !!!

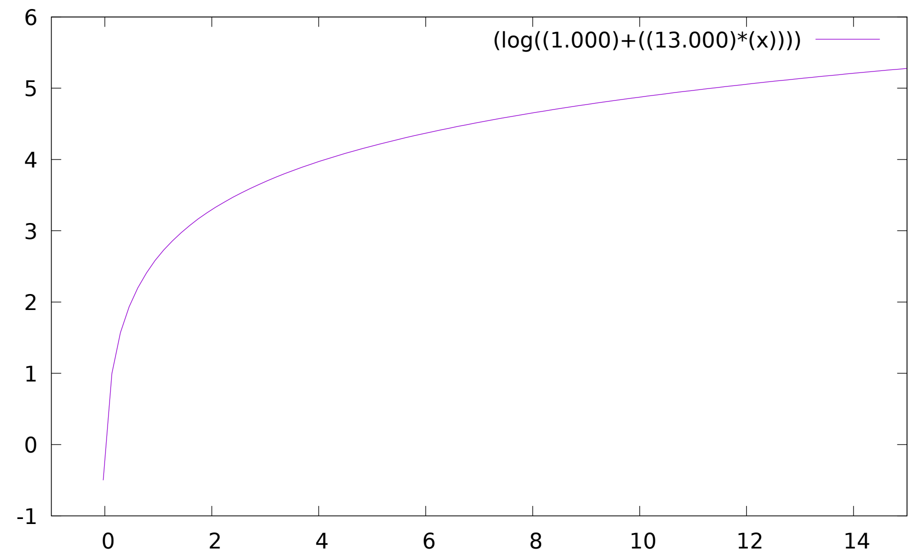
Finding full derivation Full derivation:
$\sqrt{(13.000 \cdot \frac{1.000}{1.000+13.000\cdot x})^{2.000} + (\frac{1.000}{1.000+opa})^{2.000}}$
In the point $M_0(x_0, opa_0) = (1.000, 13.000)$ it's value = 0.93131 !!!

4 Exploration the expression as a function of the first variable

Now let's consider the expression as a function of x variable: f(x) $= \ln(1.000 + 13.000 \cdot x)$

Decomposing on Macloren's formula **Maklorens formula for** $x \to x_0 = 1.000$:
f(x) $= 2.639 + 0.929 \cdot (x - 1.000) + (-0.431) \cdot (x - 1.000)^{2.000} + 0.267 \cdot (x - 1.000)^{3.000}$+o$((x - 1.000)^{3.000})$

Graphics **Graph** f(x) $= \ln(1.000 + 13.000 \cdot x)$ on the diapasone $x \in$[-1 : 15] :



Equations in the point **Tangent equation** in the point $x_0 = 0.200$:
f(x) $= 3.611 \cdot (x - 0.200) + 1.281$
Normal equation in the point $x_0 = 0.200$:
f(x) $= (-0.277) \cdot (x - 0.200) + 1.281$
Their graphs in $\delta = 2.50000$ coverage of the point $x_0 = 0.200000$