

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:
!-Constants (3): ! [0] e = 2.718282 ! [1] pi = 3.141593 ! [2] AbObA = 1337.228690 !
!-Variables (2): ! [3] x = 1.000000 ! [4] opa = 13.000000
Number of differentiates: 3
Macloren's accuracy: 3
Tanget point: 0.200000
Delta coverage: 2.500000
Graph diapasone: [-1 : 15]
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 · 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 · 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 · 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 · 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 · 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 · 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 · 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 · 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:
 $(\frac{1.000}{1.000+x \cdot opa})' = ... = [top\ secret] = ... =$
= $\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^2 \cdot 000}$
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:
 $(\frac{1.000}{1.000+x \cdot opa} \cdot (opa + x))' = ... = [top\ secret] = ... =$
= $\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^2 \cdot 000} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x \cdot opa}$
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 · 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:
 $(1.000)' = \dots = [\text{top secret}] = \dots =$
 $= 0.000$
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:
 $(1.000 + x \cdot opa)' = \dots = [\text{top secret}] = \dots =$
 $= opa + x$
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:
 $(1.000)' = \dots = [\text{top secret}] = \dots =$
 $= 0.000$
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:
 $(\frac{1.000}{1.000+x \cdot opa})' = \dots = [\text{top secret}] = \dots =$
 $= \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$
8 **step**: Finding a derivation of 2.000
What if:
 $(2.000)' = \dots = [\text{top secret}] = \dots =$
 $= 0.000$
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:
 $(2.000 \cdot \frac{1.000}{1.000+x \cdot opa})' = \dots = [\text{top secret}] = \dots =$
 $= 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$
10 **step**: Finding a derivation of x
thanks to the results of my colleagues' scientific work, I know that:
 $(x)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
11 **step**: Finding a derivation of opa
Even my two-aged sister knows that:
 $(opa)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
12 **step**: Finding a derivation of $opa + x$
While preparing for exams, I learned a lot of new things, for example:
 $(opa + x)' = \dots = [\text{top secret}] = \dots =$
 $= 2.000$
13 **step**: Finding a derivation of opa
When I was child, my father always told me: "Remember, son:
 $(opa)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
14 **step**: Finding a derivation of x
It's really easy to find:
 $(x)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
15 **step**: Finding a derivation of $x \cdot opa$
For centuries, people have hunted for the secret knowledge that:
 $(x \cdot opa)' = \dots = [\text{top secret}] = \dots =$
 $= opa + x$
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:
 $(1.000)' = \dots = [\text{top secret}] = \dots =$
 $= 0.000$
17 **step**: Finding a derivation of $1.000 + x \cdot opa$
Sounds logical that it is the same as:
 $(1.000 + x \cdot opa)' = \dots = [\text{top secret}] = \dots =$
 $= opa + x$
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:
 $((1.000 + x \cdot opa)^{2.000})' = \dots = [\text{top secret}] = \dots =$
 $= 2.000 \cdot (1.000 + x \cdot opa) \cdot (opa + x)$
19 **step**: Finding a derivation of x
While preparing for exams, I learned a lot of new things, for example:
 $(x)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
20 **step**: Finding a derivation of opa
I spend the hole of my life to find the answer and finally it's:
 $(opa)' = \dots = [\text{top secret}] = \dots =$
 $= 1.000$
21 **step**: Finding a derivation of $opa + x$
When I was child, my father always told me: "Remember, son:
 $(opa + x)' = \dots = [\text{top secret}] = \dots =$
 $= 2.000$
22 **step**: Finding a derivation of -1.000
For centuries, people have hunted for the secret knowledge that:
 $(-1.000)' = \dots = [\text{top secret}] = \dots =$
 $= 0.000$
23 **step**: Finding a derivation of $(-1.000) \cdot (opa + x)$
What if:
 $((-1.000) \cdot (opa + x))' = \dots = [\text{top secret}] = \dots =$
 $= -2.000$
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:
 $(\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}})' = \dots = [\text{top secret}] = \dots =$
 $= \frac{(-2.000) \cdot (1.000+x \cdot opa)^{2.000} - 2.000 \cdot (1.000+x \cdot opa) \cdot (opa+x) \cdot (-1.000) \cdot (opa+x)}{((1.000+x \cdot opa)^{2.000})^{2.000}}$
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:
 $(\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} \cdot (opa + x))' = \dots = [\text{top secret}] = \dots =$
 $= \frac{(-2.000) \cdot (1.000+x \cdot opa)^{2.000} - 2.000 \cdot (1.000+x \cdot opa) \cdot (opa+x) \cdot (-1.000) \cdot (opa+x)}{((1.000+x \cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$
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:
 $(\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x \cdot opa})' = \dots = [\text{top secret}] = \dots =$
 $= \frac{(-2.000) \cdot (1.000+x \cdot opa)^{2.000} - 2.000 \cdot (1.000+x \cdot opa) \cdot (opa+x) \cdot (-1.000) \cdot (opa+x)}{((1.000+x \cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} + 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$
Finally... The 3 derivation of the expression:
 $f^{(3)}(x, opa) = \frac{(-2.000) \cdot (1.000+x \cdot opa)^{2.000} - 2.000 \cdot (1.000+x \cdot opa) \cdot (opa+x) \cdot (-1.000) \cdot (opa+x)}{((1.000+x \cdot opa)^{2.000})^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} + 2.000 \cdot \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$
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 !!!

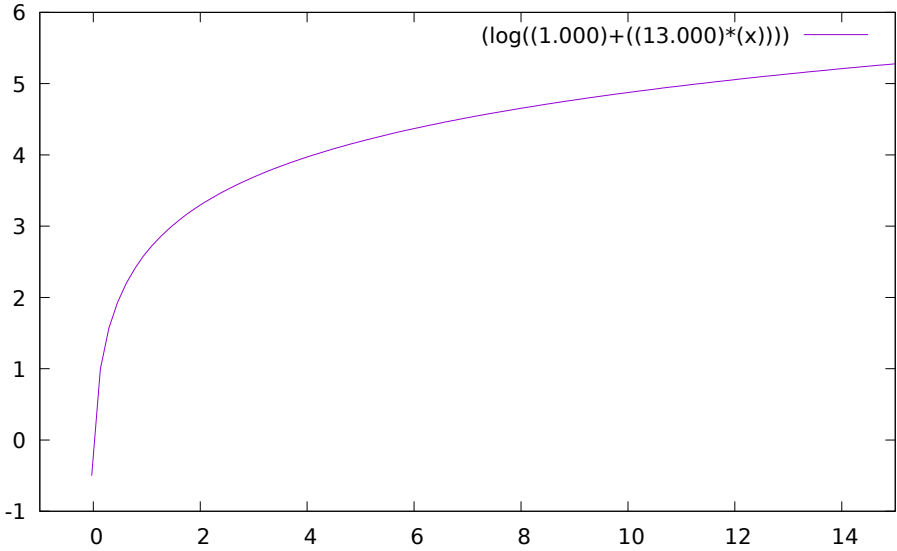
4 Exploration the expression as a function of the first variable

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 $x \rightarrow x_0 = 1.000$:

$f(x) = 2.639 + 0.929 \cdot (x - 1.000) + (-0.431) \cdot (x - 1.000)^{2.000} + 0.267 \cdot (x - 1.000)^{3.000} + o((x - 1.000)^{3.000})$

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 $x_0 = 0.200000$

