

1 Introduction

CrInGeCrInGeProduction.Supercringeintroductionhere :

2 Some basic knowledge about researching problem...

Parameters and constants we use in this work:

Constants (3):  
e = 2.718282  
pi = 3.141593  
AbObA = 1337.228690  
Variables (2):  
x = 1.000000  
opa = 13.000000  
Parameters of exploration :  
Number of differentiates : 2  
Macloren's accuracy : 3  
Tanget point : 0.200000  
Delta coverage of tangent point: 2.500000  
Graph diapasone : [-1 : 15]  
So let's calculate smth with a given function: f(x, opa) = ln (1.000 + x · opa)  
Firstly, let's simplify this expression (if possible): f(x, opa) = ln (1.000 + x · 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 · 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 · 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 · 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 2 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 · 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 · 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 · 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:

$(opa)'\text{ = ... = top secret = ... =}$   
 = 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:  
 $(opa + x)'\text{ = ... = top secret = ... =}$   
 = 2.000  
 4 step: Finding a derivation of  $opa$   
 thanks to the results of my colleagues' scientific work, I know that:  
 $(opa)'\text{ = ... = top secret = ... =}$   
 = 1.000  
 5 step: Finding a derivation of  $x$   
 My roommate mumbled it in his sleep all night:  
 $(x)'\text{ = ... = top secret = ... =}$   
 = 1.000  
 6 step: Finding a derivation of  $x \cdot opa$   
 Even my two-aged sister knows that:  
 $(x \cdot opa)'\text{ = ... = top secret = ... =}$   
 =  $opa + x$   
 7 step: Finding a derivation of 1.000  
 Man... Just look:  
 $(1.000)'\text{ = ... = top secret = ... =}$   
 = 0.000  
 8 step: Finding a derivation of  $1.000 + x \cdot opa$   
 For centuries, people have hunted for the secret knowledge that:  
 $(1.000 + x \cdot opa)'\text{ = ... = top secret = ... =}$   
 =  $opa + x$   
 9 step: Finding a derivation of 1.000  
 I was asked not to tell anyone that:  
 $(1.000)'\text{ = ... = top secret = ... =}$   
 = 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:  
 $(\frac{1.000}{1.000+x \cdot opa})'\text{ = ... = top secret = ... =}$   
 =  $\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}}$   
 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:  
 $(\frac{1.000}{1.000+x \cdot opa} \cdot (opa + x))'\text{ = ... = top secret = ... =}$   
 =  $\frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x \cdot opa}$   
**Finally... The 2 derivation of the expression:**  
 $f^{(2)}(x, opa) = \frac{(-1.000) \cdot (opa+x)}{(1.000+x \cdot opa)^{2.000}} \cdot (opa + x) + 2.000 \cdot \frac{1.000}{1.000+x \cdot opa}$   
 BRITISH SCIENTISTS WERE SHOCKED AGAIN, WHEN THEY COUNT THE 2 DERIVATION OF THIS EXPRESSION!!!  
 In the point  $M_0(x_0, opa_0) = (1.000, 13.000)$  it's value = -0.85714

**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 !!!

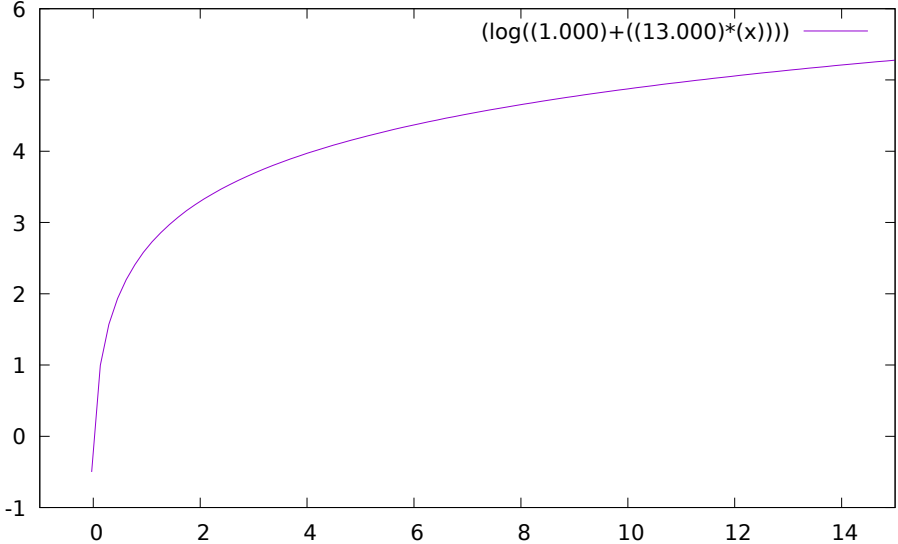
**Finding full derivation**    Full derivation:  
 $\sqrt{(13.000 \cdot \frac{1.000}{1.000+13.000 \cdot x})^{2.000} + (\frac{1.000}{1.000+opa})^{2.000}}$   
 In the point  $M_0(x_0, opa_0) = (1.000, 13.000)$  it's value = 0.93131 !!!

## 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  $x_0 = 0.200000$

