1 Introduction

$CrInGeCrInGeProduction.Supercringeintroductionhere:$

2 Some basic knowledge about researching problem...

Let's calculate smth with a given function: f(x) = $\ln(1.000 + x)$
Firstly, let's simplify this expression (if possible): f(x) = $\ln(1.000 + x)$

3 Exploration of the expression

Calculation value of function in the point BRITISH SCIENTISTS WERE SHOCKED, WHEN THEY COUNT IT!!!
In the point $M_0(x_0) = (1.000)$ **it's value** = 0.69315
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 x
When I was child, my father always told me: "Remember, son:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of 1.000
thanks to the results of my colleagues' scientific work, I know that:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`3 step:` Finding a derivation of $1.000 + x$
What if:
$(1.000 + x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`4 step:` Finding a derivation of $\ln(1.000 + x)$
If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(\ln(1.000 + x))' = ... = [\text{top secret}] = ... =$
$= \frac{1.000}{1.000+x}$
Congratulations! **The first derivation of the expression** is:
$f'(x) = \frac{1.000}{1.000+x}$
In the point $M_0(x_0) = (1.000)$ it's value = 0.50000

Finding the 3 derivation Let's find **the 1 derivation** of the expression:
`1 step:` Finding a derivation of x
It's really easy to find:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of 1.000
My friends always beat me, because I didn't know that:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`3 step:` Finding a derivation of $1.000 + x$
Sounds logical that it is the same as:
$(1.000 + x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`4 step:` Finding a derivation of $\ln(1.000 + x)$
My roommate mumbled it in his sleep all night:
$(\ln(1.000 + x))' = ... = [\text{top secret}] = ... =$
$= \frac{1.000}{1.000+x}$
Let's find **the 2 derivation** of the expression:
`1 step:` Finding a derivation of x
What if:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of 1.000
While preparing for exams, I learned a lot of new things, for example:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`3 step:` Finding a derivation of $1.000 + x$
Sounds logical that it is the same as:
$(1.000 + x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`4 step:` Finding a derivation of 1.000
I was asked not to tell anyone that:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`5 step:` Finding a derivation of $\frac{1.000}{1.000+x}$
Even my two-aged sister knows that:
$(\frac{1.000}{1.000+x})' = ... = [\text{top secret}] = ... =$
$= \frac{(-1.000)\cdot 1.000}{(1.000+x)^{2.000}}$
Let's find **the 3 derivation** of the expression:
`1 step:` Finding a derivation of x
I was asked not to tell anyone that:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of 1.000
If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`3 step:` Finding a derivation of $1.000 + x$
thanks to the results of my colleagues' scientific work, I know that:
$(1.000 + x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`4 step:` Finding a derivation of $(1.000 + x)^{2.000}$
My roommate mumbled it in his sleep all night:

$((1.000+x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot (1.000+x)$

`5 step:` Finding a derivation of -1.000

Even my two-aged sister knows that:

$(-1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$

`6 step:` Finding a derivation of $\frac{(-1.000)}{(1.000+x)^{2.000}}$

Man... Just look:

$(\frac{(-1.000)}{(1.000+x)^{2.000}})' = ... = [\text{top secret}] = ... =$
$= \frac{(-1.000)\cdot(-1.000)\cdot 2.000\cdot(1.000+x)}{((1.000+x)^{2.000})^{2.000}}$

Finally... The 3 derivation of the expression:

$f^{(3)}(\mathrm{x}) = \frac{(-1.000)\cdot(-1.000)\cdot 2.000\cdot(1.000+x)}{((1.000+x)^{2.000})^{2.000}}$

BRITISH SCIENTISTS WERE SHOCKED AGAIN, WHEN THEY COUNT THE 3 DERIVATION OF THIS EXPRESSION!!!

In the point $M_0(x_0) = (1.000)$ it's value $= 0.25000$

Finding partical derivations Partial derivation of the expression on the variable x:

$\frac{\partial f}{\partial x} = \frac{1.000}{1.000+x}$

In the point $M_0(x_0) = (1.000)$ it's value $= 0.50000$!!!

Finding full derivation Full derivation:

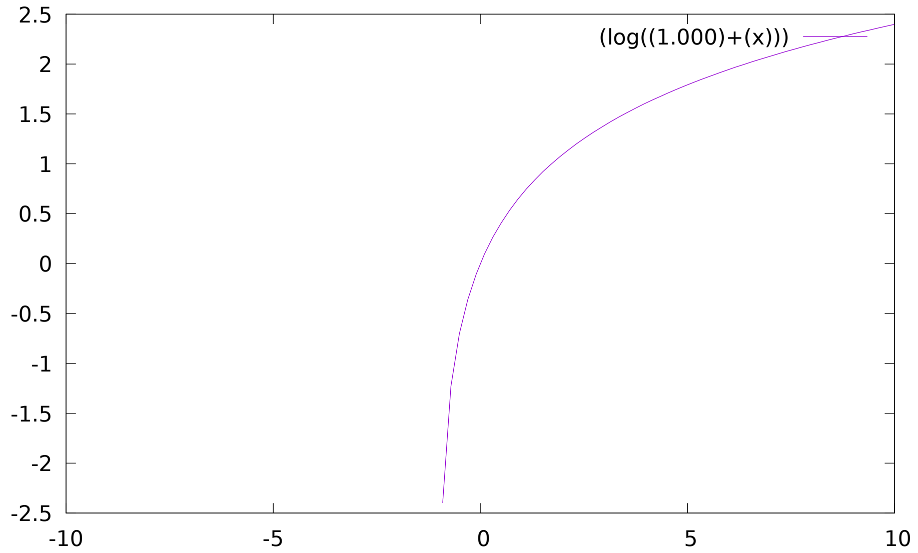
$\sqrt{(\frac{1.000}{1.000+x})^{2.000}}$

In the point $M_0(x_0) = (1.000)$ it's value $= 0.50000$!!!

Decomposing on Macloren's formula **Maklorens formula for** $x \to x_0 = 1.000$:

$\mathrm{f(x)} = 0.693 + 0.500\cdot(x-1.000) + (-0.125)\cdot(x-1.000)^{2.000} + 0.042\cdot(x-1.000)^{3.000} + (-0.016)\cdot(x-1.000)^{4.000} + \mathrm{o}((x-1.000)^{4.000})$

Graphics **Graph** $\mathrm{f(x)} = \ln(1.000+x)$ on the diapasone $x \in [-10:10]$:



Equations in the point **Tangent equation** in the point $x_0 = 1.000$:

$\mathrm{f(x)} = 0.500\cdot(x-1.000) + 0.693$

Normal equation in the point $x_0 = 1.000$:

$\mathrm{f(x)} = (-2.000)\cdot(x-1.000) + 0.693$

Their graphs in $\delta = 1.00000$ coverage of the point $x_0 = 1.000000$