1 Introduction

$$CrInGeCrInGeProduction.Supercringeintroductionhere :$$

Let's calculate smth with a given function: f(x) = $(\sin x)^{3.000}$
Firstly, let's insert all constants and simplify this expression: f(x) = $(\sin x)^{3.000}$

2 Exploration 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 $M_0(x_0) = (3.000)$ **it's value** = 0.00281
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
While preparing for exams, I learned a lot of new things, for example:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of $\sin x$
It's really easy to find:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`3 step:` Finding a derivation of $(\sin x)^{3.000}$
My roommate mumbled it in his sleep all night:
$((\sin x)^{3.000})' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot (\sin x)^{2.000} \cdot \cos x$
Congratulations! **The first derivation of the expression** is:
f'(x) = $3.000 \cdot (\sin x)^{2.000} \cdot \cos x$
In the point $M_0(x_0) = (3.000)$ it's value = -0.05915

Finding the 3 derivation: Let's find **the 1 derivation** of the expression:
`1 step:` Finding a derivation of x
Sounds logical that it is the same as:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of $\sin x$
For centuries, people have hunted for the secret knowledge that:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`3 step:` Finding a derivation of $(\sin x)^{3.000}$
Sounds logical that it is the same as:
$((\sin x)^{3.000})' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot (\sin x)^{2.000} \cdot \cos x$
Let's find **the 2 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 $\cos x$
My roommate mumbled it in his sleep all night:
$(\cos x)' = ... = [\text{top secret}] = ... =$
$= (-1.000) \cdot \sin x$
`3 step:` Finding a derivation of x
What if:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`4 step:` Finding a derivation of $\sin x$
It's really easy to find:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`5 step:` Finding a derivation of $(\sin x)^{2.000}$
Even my two-aged sister knows that:
$((\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot \sin x \cdot \cos x$
`6 step:` Finding a derivation of 3.000
When I was child, my father always told me: "Remember, son:
$(3.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`7 step:` Finding a derivation of $3.000 \cdot (\sin x)^{2.000}$
I spend the hole of my life to find the answer and finally it's:
$(3.000 \cdot (\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x$
`8 step:` Finding a derivation of $3.000 \cdot (\sin x)^{2.000} \cdot \cos x$
Man... Just look:
$(3.000 \cdot (\sin x)^{2.000} \cdot \cos x)' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot (\sin x)^{2.000}$
Let's find **the 3 derivation** of the expression:
`1 step:` Finding a derivation of x
For centuries, people have hunted for the secret knowledge that:

$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`2 step:` Finding a derivation of $\sin x$
It's really easy to find:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`3 step:` Finding a derivation of $(\sin x)^{2.000}$
It's simple as fuck:
$((\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot \sin x \cdot \cos x$
`4 step:` Finding a derivation of 3.000
thanks to the results of my colleagues' scientific work, I know that:
$(3.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`5 step:` Finding a derivation of $3.000 \cdot (\sin x)^{2.000}$
When I was child, my father always told me: "Remember, son:
$(3.000 \cdot (\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x$
`6 step:` Finding a derivation of x
It's really easy to find:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`7 step:` Finding a derivation of $\sin x$
I was asked not to tell anyone that:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`8 step:` Finding a derivation of -1.000
For centuries, people have hunted for the secret knowledge that:
$(-1.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`9 step:` Finding a derivation of $(-1.000) \cdot \sin x$
My roommate mumbled it in his sleep all night:
$((-1.000) \cdot \sin x)' = ... = [\text{top secret}] = ... =$
$= (-1.000) \cdot \cos x$
`10 step:` Finding a derivation of $(-1.000) \cdot \sin x \cdot 3.000 \cdot (\sin x)^{2.000}$
What if:
$((-1.000) \cdot \sin x \cdot 3.000 \cdot (\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= (-1.000) \cdot \cos x \cdot 3.000 \cdot (\sin x)^{2.000} + 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot (-1.000) \cdot \sin x$
`11 step:` Finding a derivation of x
Even my two-aged sister knows that:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`12 step:` Finding a derivation of $\cos x$
I spend the hole of my life to find the answer and finally it's:
$(\cos x)' = ... = [\text{top secret}] = ... =$
$= (-1.000) \cdot \sin x$
`13 step:` Finding a derivation of x
Even my two-aged sister knows that:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`14 step:` Finding a derivation of $\cos x$
While preparing for exams, I learned a lot of new things, for example:
$(\cos x)' = ... = [\text{top secret}] = ... =$
$= (-1.000) \cdot \sin x$
`15 step:` Finding a derivation of x
When I was child, my father always told me: "Remember, son:
$(x)' = ... = [\text{top secret}] = ... =$
$= 1.000$
`16 step:` Finding a derivation of $\sin x$
Sounds logical that it is the same as:
$(\sin x)' = ... = [\text{top secret}] = ... =$
$= \cos x$
`17 step:` Finding a derivation of 2.000
A true prince must know that:
$(2.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$
`18 step:` Finding a derivation of $2.000 \cdot \sin x$
My roommate mumbled it in his sleep all night:
$(2.000 \cdot \sin x)' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot \cos x$
`19 step:` Finding a derivation of $2.000 \cdot \sin x \cdot \cos x$
My roommate mumbled it in his sleep all night:
$(2.000 \cdot \sin x \cdot \cos x)' = ... = [\text{top secret}] = ... =$
$= 2.000 \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 2.000 \cdot \sin x$
`20 step:` Finding a derivation of 3.000
If someone asked me that in the middle of the night, I wouldn't hesitate to say:
$(3.000)' = ... = [\text{top secret}] = ... =$
$= 0.000$

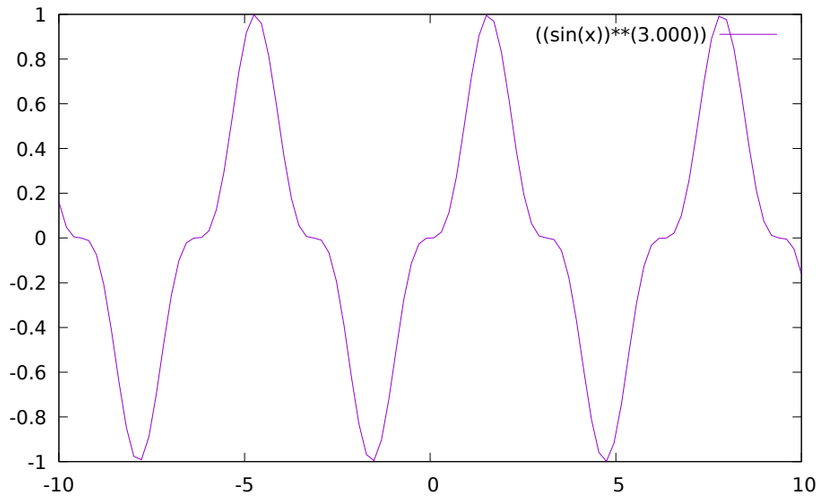
`21 step:` Finding a derivation of $3.000 \cdot 2.000 \cdot \sin x \cdot \cos x$
A true prince must know that:
$(3.000 \cdot 2.000 \cdot \sin x \cdot \cos x)' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot (2.000 \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 2.000 \cdot \sin x)$
`22 step:` Finding a derivation of $3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot \cos x$
My roommate mumbled it in his sleep all night:
$(3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot \cos x)' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot (2.000 \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 2.000 \cdot \sin x) \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x$
`23 step:` Finding a derivation of $3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot (\sin x)^{2.000}$
While preparing for exams, I learned a lot of new things, for example:
$(3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot (\sin x)^{2.000})' = ... = [\text{top secret}] = ... =$
$= 3.000 \cdot (2.000 \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 2.000 \cdot \sin x) \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x + (-1.000) \cdot \cos x \cdot 3.000 \cdot (\sin x)^{2.000} + 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot (-1.000) \cdot \sin x$
Finally... The 3 derivation of the expression:
$f^{(3)}(\mathrm{x}) = 3.000 \cdot (2.000 \cdot \cos x \cdot \cos x + (-1.000) \cdot \sin x \cdot 2.000 \cdot \sin x) \cdot \cos x + (-1.000) \cdot \sin x \cdot 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x + (-1.000) \cdot \cos x \cdot 3.000 \cdot (\sin x)^{2.000} + 3.000 \cdot 2.000 \cdot \sin x \cdot \cos x \cdot (-1.000) \cdot \sin x$
BRITISH SCIENTISTS WERE SHOCKED AGAIN, WHEN THEY COUNT THE 3 DERIVATION OF THIS EXPRESSION!!!
In the point $M_0(x_0) = (3.000)$ it's value = -5.40763

Finding partical derivations: Partial derivation of the expression on the variable x:
$\frac{\partial f}{\partial x} = 3.000 \cdot (\sin x)^{2.000} \cdot \cos x$
In the point $M_0(x_0) = (3.000)$ it's value = -0.05915 !!!

Finding full derivation: Full derivation:
$\sqrt{(3.000 \cdot (\sin x)^{2.000} \cdot \cos x)^{2.000}}$
In the point $M_0(x_0) = (3.000)$ it's value = 0.05915 !!!

3 Exploration the function of the first variable

Now let's consider the expression as a function of x variable: $\mathrm{f(x)} = (\sin x)^{3.000}$
Maklorens formula for $x \to x_0 = 3.000$:
$\mathrm{f(x)} = 0.003 + (-0.059) \cdot (x - 3.000) + 0.411 \cdot (x - 3.000)^{2.000} + (-0.901) \cdot (x - 3.000)^{3.000} + (-0.343) \cdot (x - 3.000)^{4.000} + \mathrm{o}((x - 3.000)^{4.000})$
Graph $\mathrm{f(x)} = (\sin x)^{3.000}$ on the diapasone $x \in [-10 : 10]$:



Tangent equation in the point $x_0 = 1.000$:
$\mathrm{f(x)} = 1.148 \cdot (x - 1.000) + 0.596$
Normal equation in the point $x_0 = 1.000$:
$\mathrm{f(x)} = (-0.871) \cdot (x - 1.000) + 0.596$