# Derivatives in LaTeX

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So, we're going to find the derivative of that interesting function:

$$\frac{\frac{x+x^2 \cdot 3 \cdot x-3}{\sin(x)}}{\cos(2+x)} \cdot \lg(x)$$

But first of all lets try to simplify it!

LOL! No more easy

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!

Elementary:

$$(x)' = 1$$

DECIMAL LOGARITHM is the best LOGARITHM because it's used for stellar magnetudes and decibels. So

$$(\lg(f(x)))' = \frac{1}{f(x) \cdot ln(10)} \cdot f'(x)$$

So:

$$(\lg(x))' = \frac{1}{x \cdot \ln(10)} \cdot 1$$

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!

It's really easy to see:

$$(x)' = 1$$

Only a fool does not know that the derivative of NUMBER is 0!

Easy:

$$(2)' = 0$$

As we know the derivative of ADDITION is ADDITION of derivatives!

In that case:

$$(2+x)' = 0+1$$

COSINUS is not very simple function, we'd use special formula

$$(\cos(f(x))' = -\sin(f(x)) \cdot f'(x)$$

It's really easy to see:

$$(\cos(2+x))' = -1 \cdot \sin(2+x) \cdot (0+1)$$

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!

Then:

$$(x)' = 1$$

SINUS is really difficult function that's why we should use formula

$$(\sin(f(x))' = \cos(f(x)) \cdot f'(x)$$

Then:

$$(\sin(x))' = \cos(x) \cdot 1$$

Only a fool does not know that the derivative of NUMBER is 0!
Clearly:

$$(3)' = 0$$

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!
It's really easy to see:

$$(x)' = 1$$

Only a fool does not know that the derivative of NUMBER is 0!
You can see:

$$(3)' = 0$$

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!
You can see:

$$(x)' = 1$$

Function to the POWER of number is interesting

$$(f^a(x))' = a \cdot f^{a-1}(x) \cdot f'(x)$$

Elementary:

$$\left(x^2\right)' = 2 \cdot x^1 \cdot 1$$

It's clear that the derivative of MULTIPLICATION is given by formula

$$(f(x) \cdot g(x))' = f'(x) \cdot g(x) + g'(x) \cdot f(x)$$

So:

$$\left(x^2 \cdot 3\right)' = 2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2$$

It's clear that the derivative of MULTIPLICATION is given by formula

$$(f(x) \cdot g(x))' = f'(x) \cdot g(x) + g'(x) \cdot f(x)$$

Elementary:

$$\left(x^2 \cdot 3 \cdot x\right)' = \left(2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2\right) \cdot x + 1 \cdot x^2 \cdot 3$$

It's as easy as a breathe to understand that the derivative of VARIABLE is 1!

Elementary:

$$(x)' = 1$$

As we know the derivative of ADDITION is ADDITION of derivatives!

You can see:

$$\left(x + x^2 \cdot 3 \cdot x\right)' = 1 + \left(2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2\right) \cdot x + 1 \cdot x^2 \cdot 3$$

Everybody knows that the derivative of SUBTRACT is SUBTRACT of derivatives!

Clearly:

$$\left(x + x^2 \cdot 3 \cdot x - 3\right)' = 1 + \left(2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2\right) \cdot x + 1 \cdot x^2 \cdot 3 - 0$$

Not difficult to notice that the derivative of DIVISION is given by formula

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x) \cdot g(x) - g'(x) \cdot f(x)}{g^2(x)}$$

So:

$$\left(\frac{x + x^2 \cdot 3 \cdot x - 3}{\sin(x)}\right)' = \frac{(1 + (2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2) \cdot x + 1 \cdot x^2 \cdot 3 - 0) \cdot \sin(x) - \cos(x) \cdot 1 \cdot (x + x^{2}}{\sin^2(x)}$$

Not difficult to notice that the derivative of DIVISION is given by formula

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x) \cdot g(x) - g'(x) \cdot f(x)}{g^2(x)}$$

It's clear that:

$$\left(\frac{\frac{x+x^2 \cdot 3 \cdot x - 3}{\sin(x)}}{\cos(2+x)}\right)' = \frac{\frac{\left(1+\left(2 \cdot x^1 \cdot 1 \cdot 3 + 0 \cdot x^2\right) \cdot x + 1 \cdot x^2 \cdot 3 - 0\right) \cdot \sin(x) - \cos(x) \cdot 1 \cdot \left(x + x^2 \cdot 3 \cdot x - 3\right)}{\sin^2(x)} \cdot \cos(2+x) - -1 \cdot \sin(2+x)}{\cos^2(2+x)}$$

It's clear that the derivative of MULTIPLICATION is given by formula

$$(f(x) \cdot g(x))' = f'(x) \cdot g(x) + g'(x) \cdot f(x)$$

Elementary:

$$\left(\frac{\frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos\left(2+x\right)}\cdot \lg\left(x\right)\right)' = \frac{\frac{\left(1+\left(2\cdot x^1\cdot 1\cdot 3+0\cdot x^2\right)\cdot x+1\cdot x^2\cdot 3-0\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin}{\cos^2\left(2+x\right)}$$

Lets try to simplify our REALLY BIG derivative

$$\frac{\frac{\left(1+\left(2\cdot x^1\cdot 1\cdot 3+0\cdot x^2\right)\cdot x+1\cdot x^2\cdot 3-0\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot \left(0+1\right)\cdot \frac{x+x^2\cdot 3\cdot x-}{\sin(x)}}{\cos^2\left(2+x\right)}$$

It's really easy to see:

$$\frac{\frac{\left(1+\left(2\cdot x^1\cdot 1\cdot 3+0\cdot x^2\right)\cdot x+1\cdot x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)$$

Clearly:

$$\frac{\frac{\left(1+\left(2\cdot x^1\cdot 3+0\cdot x^2\right)\cdot x+1\cdot x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)+$$

As you can see:

$$\frac{\frac{\left(1+\left(2x\cdot 3+0\cdot x^2\right)\cdot x+1\cdot x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)+\frac{}{x}$$

Clearly:

$$\frac{\frac{\left(1+\left(2x\cdot 3+0\right)\cdot x+1\cdot x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)+\frac{}{x\cdot \mathrm{l}}$$

Clearly:

$$\frac{\frac{\left(1+2x\cdot 3\cdot x+1\cdot x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)+\frac{1}{x\cdot \ln\left(1\right.}$$

Elementary:

$$\frac{\frac{\left(1+2x\cdot 3\cdot x+x^2\cdot 3\right)\cdot \sin(x)-\cos(x)\cdot 1\cdot \left(x+x^2\cdot 3\cdot x-3\right)}{\sin^2(x)}\cdot \cos\left(2+x\right)--1\cdot \sin\left(2+x\right)\cdot 1\cdot \frac{x+x^2\cdot 3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot \lg\left(x\right)+\frac{1}{x\cdot \ln\left(10\right.}$$

It's clear that:

$$\frac{\frac{\left(1+2x\cdot3\cdot x+x^2\cdot3\right)\cdot\sin(x)-\cos(x)\cdot\left(x+x^2\cdot3\cdot x-3\right)}{\sin^2(x)}\cdot\cos\left(2+x\right)--1\cdot\sin\left(2+x\right)\cdot1\cdot\frac{x+x^2\cdot3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot\lg\left(x\right)+\frac{1}{x\cdot\ln\left(10\right)}$$

Then:

$$\frac{\frac{\left(1+2x\cdot3\cdot x+x^2\cdot3\right)\cdot\sin(x)-\cos(x)\cdot\left(x+x^2\cdot3\cdot x-3\right)}{\sin^2(x)}\cdot\cos\left(2+x\right)--1\cdot\sin\left(2+x\right)\cdot\frac{x+x^2\cdot3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot\lg\left(x\right)+\frac{1}{x\cdot\ln\left(10\right)}\cdot1\cdot$$

You can see:

$$\frac{\frac{\left(1+2x\cdot3\cdot x+x^2\cdot3\right)\cdot\sin(x)-\cos(x)\cdot\left(x+x^2\cdot3\cdot x-3\right)}{\sin^2(x)}\cdot\cos\left(2+x\right)--1\cdot\sin\left(2+x\right)\cdot\frac{x+x^2\cdot3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot\lg\left(x\right)+\frac{1}{x\cdot\ln\left(10\right)}\cdot$$

EEEE! That looks like really easy nice

$$\frac{\frac{\left(1+2x\cdot3\cdot x+x^2\cdot3\right)\cdot\sin(x)-\cos(x)\cdot\left(x+x^2\cdot3\cdot x-3\right)}{\sin^2(x)}\cdot\cos\left(2+x\right)--1\cdot\sin\left(2+x\right)\cdot\frac{x+x^2\cdot3\cdot x-3}{\sin(x)}}{\cos^2\left(2+x\right)}\cdot\lg\left(x\right)+\frac{1}{x\cdot\ln\left(10\right)}\cdot$$

Derivatives are really easy!