# Taking the derivative of a function

Let $f(x) = \exp(x^2/2) + \sin(x^3+1) * \tan(\ln(x^2+1)+2)$

Next, we will take the derivative $f_x^{'}(x)$:

Step-by-step solution:
$(\exp(x^2/2) + \sin(x^3+1) * \tan(\ln(x^2+1)+2))^{'} = (\sin(x^3+1) * \tan(\ln(x^2+1)+2))^{'} + (\exp(x^2/2))^{'}$
$((\sin(x^3+1)) * (\tan(\ln(x^2+1)+2)))^{'} = (\sin(x^3+1))^{'} * (\tan(\ln(x^2+1)+2)) + (\sin(x^3+1)) * (\tan(\ln(x^2+1)+2))^{'}$
$\tan^{'}(\ln(x^2+1)+2) = 1/\cos^2(\ln(x^2+1)+2) * (\ln(x^2+1)+2)^{'}$
$(\ln(x^2+1)+2)^{'} = 2^{'} + (\ln(x^2+1))^{'}$
$\ln^{'}(x^2+1) = 1/(x^2+1) * (x^2+1)^{'}$
$(x^2+1)^{'} = 1^{'} + (x^2)^{'}$
$(x^2)^{'} = x^{2-1} * (2 * x^{'} + x * \ln x * 2^{'})$
$\sin^{'}(x^3+1) = \cos(x^3+1) * (x^3+1)^{'}$
$(x^3+1)^{'} = 1^{'} + (x^3)^{'}$
$(x^3)^{'} = x^{3-1} * (3 * x^{'} + x * \ln x * 3^{'})$
$\exp^{'}(x^2/2) = \exp(x^2/2) * (x^2/2)^{'}$
$((x^2)/2)^{'} = ((x^2)^{'} * 2 - (x^2) * 2^{'})/2^2$
$(x^2)^{'} = x^{2-1} * (2 * x^{'} + x * \ln x * 2^{'})$

The derivative is:
$\exp(x^2/2) * ((x^{2-1} * (1*2 + x*0*\ln(x)) * 2) - (0*x^2))/2^2 + \cos(x^3+1) * (x^{3-1} * (1*3 + x*0*\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$

But you can see many unnecessary actions.
Let us make some simplifications:
$\exp(x^2/2) * ((x * (1*2 + x*0*\ln(x)) * 2) - (0*x^2))/2^2 + \cos(x^3+1) * (x^{3-1} * (1*3 + x*0*\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * ((x * (2 + x*0) * 2) - (0*x^2))/2^2 + \cos(x^3+1) * (x^{3-1} * (1*3 + x*0*\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * ((x * (2+0) * 2) - (0*x^2))/4 + \cos(x^3+1) * (x^{3-1} * (1*3 + x*0*$

$\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * ((x*2*2) - 0)/4 + \cos(x^3+1) * (x^{3-1} * (1*3 + x*0*\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * (x^2 * (1*3 + x*0*\ln(x)) + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2)*x*2*2/4 + \cos(x^3+1)*x^2*(3 + x*0*\ln(x))*\tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^{2-1} * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * (3 + x*0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^1 * (1*2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * (3 + 0) * \tan(\ln(x^2+1)+2) + 1/(\cos(\ln(x^2+1)+2))^2 * (1/(x^2+1) * (x^1 * (2 + x*0*\ln(x)) + 0) + 0) * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + (1/(x^2+1) * (x^1 * (2 + x*0*\ln(x)) + 0) + 0)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + 1/(x^2+1) * (x^1 * (2 + x*0*\ln(x)) + 0)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + (x^1 * (2 + x*0*\ln(x)) + 0)/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + x^1 * (2 + x*0*\ln(x))/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + x * (2 + x*0*\ln(x))/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + x * (2 + x*0)/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2) * x*2*2/4 + \cos(x^3+1) * x^2 * 3 * \tan(\ln(x^2+1)+2) + x * (2 + 0)/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2)*x*2*2/4 + \cos(x^3+1)*x^2*3*\tan(\ln(x^2+1)+2) + x*2/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$
$\exp(x^2/2)*x*2*2/4 + \cos(x^3+1)*x^2*3*\tan(\ln(x^2+1)+2) + x*2/(x^2+1)/(\cos(\ln(x^2+1)+2))^2 * \sin(x^3+1)$

In this way:

$$\boxed{f_x^{'}(x) = \exp{(x^2/2)} * x * 2 * 2/4 + \cos{(x^3+1)} * x^2 * 3 * \tan{(\ln{(x^2+1)}+2)} + x * 2/(x^2+1)/(c}$$

Further simplifications reader can hold their own.