FÓRMULAS DE DERIVACIÓN	EJEMPLOS
$y=a^u$; $y'=u'\cdot a^u\cdot \underbrace{\log_e a}_{\ln a}$	$y=5^x$; $y'=1\cdot 5^x\cdot \ln 5 = 5^x\cdot \ln 5$ $y=7^{x^2+1}$; $y'=2x\cdot 7^{x^2+1}\cdot \ln 7$
$y=e^u$; $y'=u'\cdot e^u\cdot \underbrace{\log_e e}_{\underbrace{\ln e}_{1}}$	$y=\frac{1}{e^x}=e^{-x}$; $y'=-1\cdot e^{-x}=-\frac{1}{e^x}$ $y=e^{\sqrt{x}}$; $y'=(\sqrt{x})'\cdot e^{\sqrt{x}}=(x^{1/2})'\cdot e^{\sqrt{x}}=$ $=\frac{1}{2}\cdot x^{-1/2}\cdot e^{\sqrt{x}}=\frac{e^{\sqrt{x}}}{2\sqrt{x}}$ $y=2\cdot e^{3x^2+1}$; $y'=2\cdot 6x\cdot e^{3x^2+1}=12x\cdot e^{3x^2+1}$
$y=u^v$; $y'=\underbrace{v\cdot u^{v-1}\cdot u'}_{\text{potencial}}+\underbrace{v'\cdot u^v\cdot \ln u}_{\text{exponencial}}$	$y=(x+3)^{2x}$; $y'=2x\cdot(x+3)^{2x-1}\cdot 1+(x+3)^{2x}\cdot 2\cdot \ln(x+3)$
$y=\log_a u$; $y'=\frac{u'}{u}\cdot \log_a e$	$y=\log_2(2x+1)$; $y=\frac{2}{2x+1}\cdot \log_2 e$
$y=\ln u$, $y'=\frac{u'}{u}\underbrace{\ln e}_{1}$	$y=\ln(x^5)$; $y'=\frac{5x^4}{x^5}=\frac{5}{x}$

Ejercicios:

$y = e^{2x}$

$y = 2^{x}$

$y = 2^{4x^2+1}$

$y = 5^{\sqrt{x}}$

$y = \dfrac{e^{2x}}{\sqrt{x}}$

$y = \dfrac{e^{x} + e^{-x}}{2}$

$y = x^3 \cdot e^{-3x}$

$y = \log_2 (x^2+1)$

$y = \ln (2x-1)$

$y = x^5 \cdot \ln x$

$y = 5 \cdot \ln x$

$y = \ln^5 x$

$y = \dfrac{\ln x}{x}$

DERIVADAS Y PROPIEDADES DE LOGARITMOS

PROPIEDAD 1 $\quad \log(u \cdot v) = \log u + \log v$

$$y = \ln\left(x^5 \cdot (3x^2+1)^3\right) = \ln x^5 + \ln(3x^2+1)^3 \;;\; y' = \frac{5x^4}{x^5} + \frac{3(3x^2+1)^2 \cdot 6x}{(3x^2+1)^3} = \frac{5}{x} + \frac{18x}{(3x^2+1)}$$

PROPIEDAD 2 $\quad \log\left(\frac{u}{v}\right) = \log u - \log v$

$$y = \ln\left(\frac{x+1}{x-1}\right) = \ln(x+1) - \ln(x-1) \;;\; y' = \frac{1}{x+1} - \frac{1}{x-1} = \frac{x-1-(x+1)}{(x+1)(x-1)} = \frac{-2}{x^2-1}$$

PROPIEDAD 3 $\quad \log u^n = n \cdot \log u$

$$y = \ln(x^3+3x)^4 = 4 \cdot \ln(x^3+3x) \;;\; y' = 4 \cdot \frac{3x^2+3}{x^3+3x}$$

Más ejemplos.

$$y = \ln\frac{x}{\sqrt{x^2+4}} = \ln x - \ln\sqrt{x^2+4} = \ln x - \frac{1}{2}\ln(x^2+4) \;;\; y' = \frac{1}{x} - \frac{1}{\cancel{2}} \cdot \frac{\cancel{2}x}{x^2+4} = \frac{\cancel{x^2}+4-\cancel{x^2}}{x \cdot (x^2+4)}$$

$$y = \ln\frac{x^3}{(x^2-1)^4} = \ln x^3 - \ln(x^2-1)^4 = 3\ln x - 4\ln(x^2-1) \;;\; y' = 3 \cdot \frac{1}{x} - 4 \cdot \frac{2x}{x^2-1} =$$

$$= \frac{3(x^2-1) - 4 \cdot 2x \cdot x}{x \cdot (x^2-1)} = \frac{-5x^2-3}{x \cdot (x^2-1)}$$

10

$$y = \ln \sqrt[3]{\cos 3x}$$

$$y = \ln \sqrt{\frac{1+\cos x}{1-\cos x}}$$

$$y = \ln \left(\frac{e^x - 1}{e^x + 1} \right)$$

$$y = \ln \frac{(x-3)^3}{\sqrt{2x-1}}$$

$$y = \ln \left((x-5)^4 \cdot e^{2x} \right)$$

$$y = \ln (x^3)$$

$$y = \ln \left(2^{\operatorname{sen} x} \right)$$