Exponential function and logarithm

Exponential function $\qquad\qquad$ $\exp:\quad x \mapsto e^x$

Natural logarithm $\qquad\qquad$ $\ln:\quad u \mapsto \ln u$

Relations

$$e^x = u \quad \Longleftrightarrow \quad x = \ln u \qquad (u > 0)$$

$e^x = \lim\limits_{n\to\infty}\left(1 + \dfrac{1}{n}\right)^n$	$\ln u = \displaystyle\int_1^u \dfrac{1}{t}\,dt$
$\exp'(x) = \exp(x) = e^x$	$\ln'(u) = \dfrac{1}{u}$
$e^0 = 1$	$\ln 1 = 0$
$e^1 = e$	$\ln e = 1$
$e^{x+y} = e^x \cdot e^y$	$\ln(uv) = \ln u + \ln v$
$e^{-x} = \frac{1}{e^x}$	$\ln \dfrac{1}{u} = -\ln u$
$\left(e^x\right)^y = e^{xy}$	$\ln(u^v) = v\,\ln u$

Exponential function and logarithm of base a $\quad$ $(a > 0,\ a \neq 1)$

$$a^x = u \quad \Longleftrightarrow \quad x = \log_a u \qquad (u > 0)$$

Change of base

$a^x = e^{x\,\ln a} = 10^{x\,\log_{10} a} = b^{x\,\log_b a}$
$\log_a u = \dfrac{\ln u}{\ln a} = \dfrac{\log_{10} u}{\log_{10} a} = \dfrac{\log_b u}{\log_b a}$