Rules of exponentiation and rules for logarithms: $\boxed{\ln x = \log_e x}$

$(a^b)^c = a^{bc}$	$\log_r(x^y) = y \log_r x$ $\log_s(x) = (\log_r x)/(\log_r s)$	$\ln(x^y) = y \ln(x)$ $\log_s(x) = (\ln x)/(\ln s)$
$a^b a^c = a^{b+c}$	$\log_r(xy) = (\log_r x) + (\log_r y)$	$\ln(xy) = (\ln x) + (\ln y)$
$a^b / a^c = a^{b-c}$	$\log_r(x/y) = (\log_r x) - (\log_r y)$	$\ln(x/y) = (\ln x) - (\ln y)$
$a^1 = a$	$\log_r(r) = 1$	$\ln(e) = 1$
$a^0 = 1$ (if $a \neq 0$)	$\log_r(1) = 0$	$\ln(1) = 0$
$\sqrt[c]{a^b} = a^{b/c} = (\sqrt[c]{a})^b$	$\log_r(\sqrt[y]{x}) = \frac{1}{y}(\log_r x)$	$\ln(\sqrt[y]{x}) = \frac{1}{y}(\ln x)$

$(a^x)' = a^x \ln a$ if $a > 0$ & a is constant; $(e^x)' = e^x$;

$(\log_a x)' = \dfrac{1}{x \ln a}$ if $a > 0$ & a is constant; $(\ln x)' = \dfrac{1}{x}$

$\log_a x$ (and $\ln x$) are only defined when $a > 0$ and $x > 0$.

$(ab)^c = a^c b^c$; $(a/b)^c = a^c / b^c$; $1^c = 1$; $0^c = 0$ (if $c \neq 0$)

$\sqrt{a^b} = a^{b/2} = (\sqrt{a})^b$	$\log_r \sqrt{x} = \frac{1}{2} \log_r x$	$\ln \sqrt{x} = \frac{1}{2} \ln x$
$1/a = a^{-1}$	$\log_r(1/x) = -\log_r x$	$\ln(1/x) = -\ln x$