Review
Laws of Logarithms & Exponents

Base a	Base e	
$a^{\log_a x} = x$	$e^{\ln x} = x$	(1)
$\log_a a^x = x$	$\ln e^x = x$	(2)
$\log_a(xy) = \log_a x + \log_a y$	$\ln(xy) = \ln x + \ln y$	(3)
$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$	$\ln\left(\frac{x}{y}\right) = \ln x - \ln y$	(4)
$\log_a x^r = r \log_a x$	$\ln x^r = r \ln x$	(5)
$\log_a a = 1$	$\ln e = 1$	(6)
$\log_a 1 = 0$	$\ln 1 = 0$	(7)
$a^{x+y} = a^x \cdot a^y$	$e^{x+y} = e^x \cdot e^y$	(8)
$a^{x-y} = \frac{a^x}{a^y}$	$e^{x-y} = \frac{e^x}{e^y}$	(9)
$(ab)^x = a^x\, b^x$	$(3e)^x = 3^x\, e^x$	(10)
$(a^x)^y = a^{xy}$	$(e^x)^y = e^{xy}$	(11)
$a^0 = 1$	$e^0 = 1$	(12)