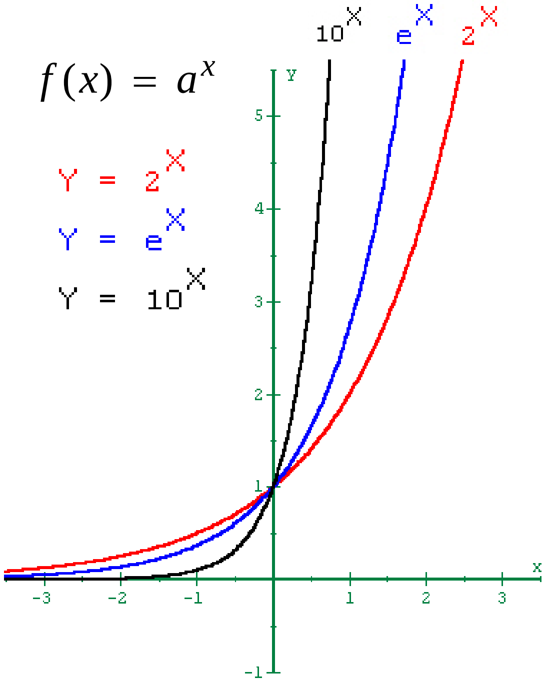
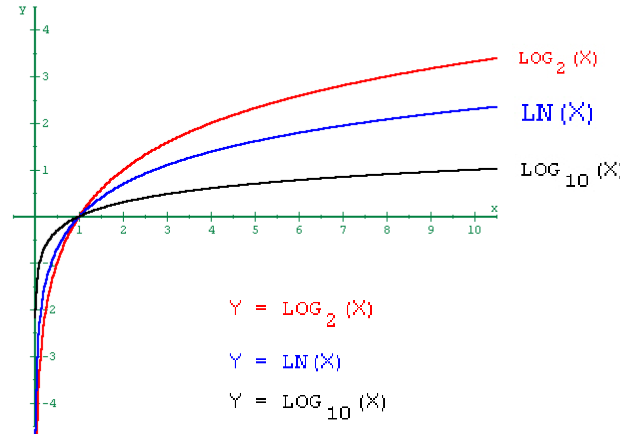
Exponential and Logarithmic Functions Summary

$f(x) = a^x$



$f^{-1}(x) = \log_a(x)$



Domain:	$(-\infty, \infty)$	Domain:	$(0, \infty)$
Range:	$(0, \infty)$	Range:	$(-\infty, \infty)$
x-intercept:	None	x-intercept:	$x = 1$
y-intercept:	$y = 1$	y-intercept:	None
Asymptote:	$y = 0$	Asymptote:	$x = 0$

Converting logarithms to exponential form: $\log_a x = y \Leftrightarrow a^y = x$

Properties of Logarithms

I $\log xy = \log x + \log y$

II $\log \dfrac{x}{y} = \log x - \log y$

III $\log x^n = n \log x$

Change of Base Formula

$\log_a x = \dfrac{\log_b x}{\log_b a}$ ex) $\log_2 x = \dfrac{\log_{10} x}{\log_{10} 2}$

$\log x = \log_{10} x$ and $\ln x = \log_e x$

$\log \dfrac{x^3\sqrt{y}}{z^4} = 3\log x + \frac{1}{2}\log y - 4\log z$

Solving Exponential Equations

$5^x = 17$

$\log 5^x = \log 17$

$x \cdot \log 5 = \log 17$

$x = \dfrac{\log 17}{\log 5} \approx 1.76$

Solving Logarithmic Equations

$\log_2(x+5) = 3 \Leftrightarrow 2^3 = x + 5$

$8 = x + 5$

$x = 3$

Compound Interest : $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Population Growth : $A = Pe^{rt}$