

# Chapter 4 Summary and Review

## Important Properties and Formulas

<i>One-to-One Function:</i>	$f(a) = f(b) \rightarrow a = b$
<i>Exponential Function:</i>	$f(x) = a^x, a > 0$ and $a \neq 1$
<i>The Number e:</i>	$e = 2.7182818284\dots$
<i>Logarithmic Function:</i>	$f(x) = \log_a x, a > 0$ and $a \neq 1$
<i>A Logarithm Is an Exponent:</i>	$\log_a x = y \leftrightarrow x = a^y$
<i>The Change-of-Base Formula:</i>	$\log_b M = \frac{\log_a M}{\log_a b}$
<i>The Product Rule:</i>	$\log_a MN = \log_a M + \log_a N$
<i>The Power Rule:</i>	$\log_a M^p = p \log_a M$
<i>The Quotient Rule:</i>	$\log_a \frac{M}{N} = \log_a M - \log_a N$
<i>Other Properties:</i>	$\log_a a = 1, \quad \log_a 1 = 0,$ $\log_a a^x = x, \quad a^{\log_a x} = x$
<i>Base–Exponent Property:</i>	$a^x = a^y \leftrightarrow x = y, \text{ for } a > 0, a \neq 1$
<i>Property of Logarithmic Equality:</i>	$\log_a M = \log_a N \leftrightarrow M = N, \text{ for } a > 0 \text{ and } a \neq 1$

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<i>Exponential Growth Model:</i>	$P(t) = P_0 e^{kt}, k > 0$
<i>Exponential Decay Model:</i>	$P(t) = P_0 e^{-kt}, k > 0$
<i>Interest Compounded Continuously:</i>	$P(t) = P_0 e^{kt}, k > 0$
<i>Doubling Time:</i>	$kT = \ln 2, \text{ or } k = \frac{\ln 2}{T}, \text{ or } T = \frac{\ln 2}{k}$
<i>Limited Growth:</i>	$P(t) = \frac{a}{1 + be^{-kt}}, k > 0$