Chapter 5 Exponential and Logarithmic Functions

Section 5.1
Algebraic functions – Functions of x that can be expressed as a finite number of sums, differences, multiples, quotients, powers and roots
Transcendental functions – Functions that are not algebraic
Exponential function *f* with base *a* – The exponential function f with base a is denoted by $f(x) = a^x$ where $a > 0$, $a \neq 1$, and x is any real number
Natural base *e* – The irrational number $e \approx 2.7182818284\ldots$
Natural exponential function – The function $f(x) = e^x$
Continuous compounding – Increasing the number of compoundings in the compound interest formula without bound leads to continuous compounding, which is given by the formula $A = Pe^{rt}$

Section 5.2
Logarithmic function with base *a* – For $x > 0$ and $0 < a \neq 1$, $y = \log_a x$ if and only if $x = a^y$. The function given by $f(x) = \log_a x$ is called the logarithmic function with base a.
Common logarithmic function – The logarithmic function with base 10
Natural logarithmic function – The logarithmic function with base e given by $f(x) = \ln x$, $x > 0$

Section 5.5
Exponential growth model – The mathematical model given by $y = ae^{bx}$, $b > 0$
Exponential decay model – The mathematical model given by $y = ae^{-bx}$, $b > 0$
Gaussian model – The mathematical model given by $y = ae^{-(x-b)^2/c}$
Logistic growth model – The mathematical model given by $y = \dfrac{a}{1+be^{-rx}}$
Logarithmic models – The mathematical models given by $y = a + b\ln x$ and $y = a + b\log_{10} x$
Bell-shaped curve – The graph of a Gaussian model
Logistic curve – A model for describing populations initially having rapid growth followed by a declining rate of growth
Sigmoidal curve – Another name for a logistic growth curve