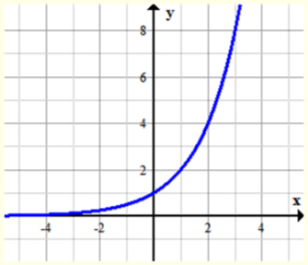
Exponential Functions

Exponential Functions - Characteristics

$y = a(b)^x$; $a \neq 0,\ b > 0,\ b \neq 1$

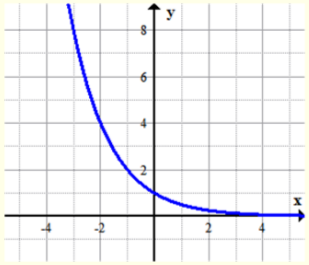
a => y-intercept
b => increasing or decreasing

Increasing (b > 1)



b = 2; doubling
b = 3; tripling
b = 1 + %; % growth

Decreasing (0 < b < 1)



b = 0.5; halving
b = 1 - %; % decrease

x - intercept: none

y - intercept: (0, a)

Domain: $x \in R$

Range: $y > 0, y \in R$

Exponential Functions - Solving Equations

Common Base

If $a^m = a^n$ then $m = n$

Graphically

$Y_1 = left\ side$
$Y_2 = right\ side$
$CALC - INTERSECT$

Useful exponent laws:

$(a^m)^n = a^{mn}$ $\quad a^{\frac{1}{n}} = \sqrt[n]{a}$

$\frac{1}{a^m} = a^{-m}$ $\quad a^0 = 1$

Verify by Substitution

Exponential Functions - Modelling

Determine an equation that may model given data, in order to solve problems.

Table Given

Perform an exponential regression with your graphing calculator.

Description Given

Generate a table of data, and then perform an exponential regression with your graphing calculator.

Make equation using knowledge of $y = a(b)^x$

Financial Applications - Compound Interest

$A = P(1+i)^n$

A = future value

P = principal (starting value)

i = interest rate per compounding period

n = number of compounding periods