Lesson 13

Read Chapter 10

Exponential functions

Function in standard exponential form : $f(x) = A_0\, a^x \quad , a > 0$ and $a \neq 1$

$f(0) = A_0$

Graphs:

More examples of graphs

Useful algebra

1. $a^{x+y} = a^x \, a^y$
2. $a^{-x} = \frac{1}{a^x}$
3. $a^{\frac{m}{n}} = \sqrt[n]{a^m}$
4. $a^{xy} = (a^x)^y$

Put $f(x) = 3 \cdot 2^{-x+\frac{1}{2}}$ in standard exponential form

Doubling time

Given an exponential function $f(x) = A_0\, a^x$, its doubling time is the period of time required for f to double in value.

The doubling time for $f(x) = A_0\, a^x$ is $\frac{\ln 2}{\ln a}$

Alternative formula

$$f(x) = A_0\, a^x = A_0 e^{\ln a\, x}$$

Viceversa

$$A_0 e^{kx} = A_0 (e^k)^x$$

Frequent questions:

1. Find an exponential function through two given points.
2. Find an exponential function through a given point, with a given doubling time.

Find a formula for the exponential function that passes through the points $(0, 2)$ and $(3, 5)$

Find a formula for the exponential function that passes through the points $(1, 2)$ and $(3, 5)$

Find a formula for the exponential function that passes through $(1, 2)$ and has doubling time 80.