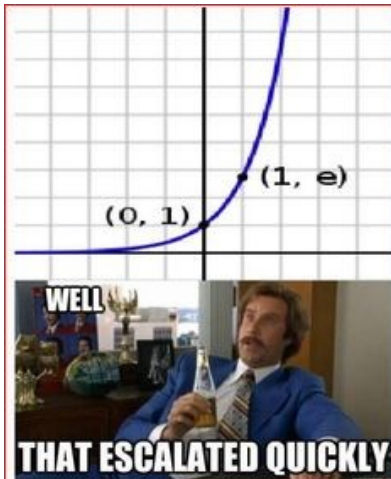


Precalculus

Lesson 5.3: Exponential Equations

Mrs. Snow, Instructor

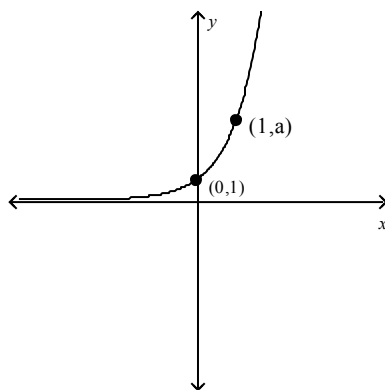


The exponential function is one of the most important functions in mathematics. The function is used to model the natural process of population growth and radioactive decay. It is also important in finances such interest and depreciation. The exponential function with base a is defined for all real numbers x by:

$$f(x) = Ca^x$$
$$y = Ca^x$$

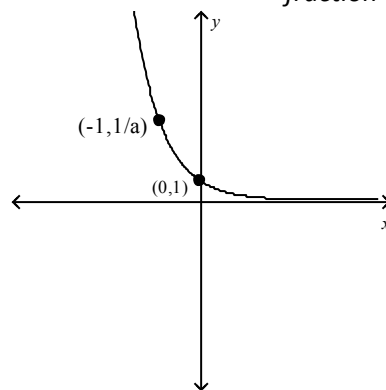
where $a > 0$ and $a \neq 1$
 a is the growth factor
 C is the initial value

$$f(x) = a^x, \quad a \neq 0$$



$$f(x) = a^x, \quad 0 < a < 1$$

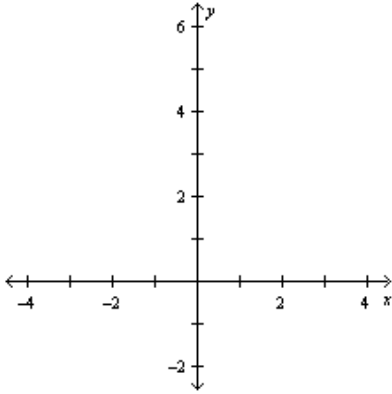
fraction



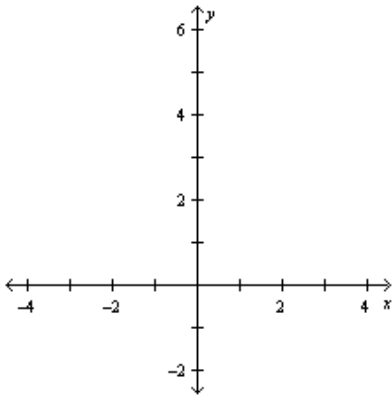
pass through a common point of $(0, 1)$
domain = $(-\infty, \infty)$
range $(0, \infty)$
asymptote at $y = 0$

Graph the Exponential Functions

$$f(x) = (2)^x$$

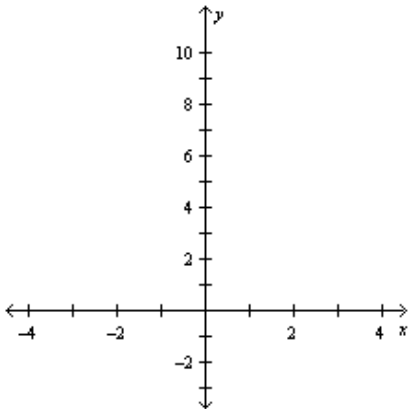


$$f(x) = \left(\frac{1}{2}\right)^x$$



Graphing Exponential Functions Using Transformations

$$f(x) = 2^{-x} - 3$$



The Natural Exponential Number

A chap named Leonard Euler named this irrational number $e = 2.71828 \dots$. Applications include the naturally occurring processes of continuous growth and decay and may also be used to model any growth/decay that is continuous.

The **number e** is defined as the number the number in the expression:

$$\left(1 + \frac{1}{n}\right)^n$$

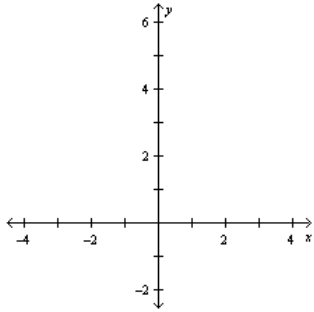
The main thing we need to recognize that an exponential equation is expressed with a base value of e

$$y = e^x$$

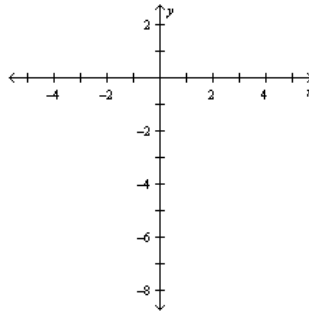
Using transformations, sketch the graph of the function:

$$f(x) = -e^{x-3}$$

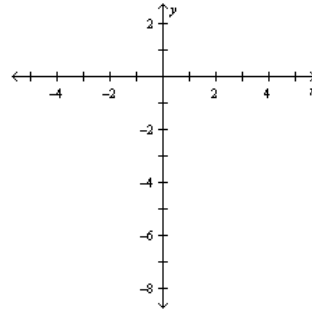
graph e^x :



reflection:



translation:



Solve an Exponential Equation:

$$4^{2x-1} = 8^x$$

$$e^{-x^2} = (e^x)^2 \frac{1}{e^3}$$