§6.3 Exponential Functions

Exponential Function:

If $a > 0$, $a \neq 1$, and x is any real number, then

$f(x) = a^x$ defines the **exponential function** with base a.

Example 1 : Evaluate the following exponential expressions with your calculator.

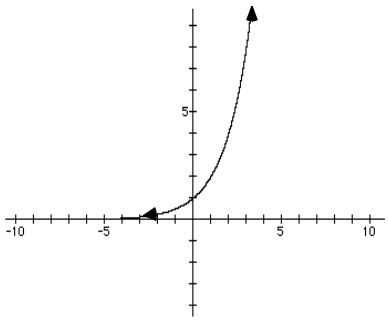
a) $2^{-3.1}$ b) 2^{π}

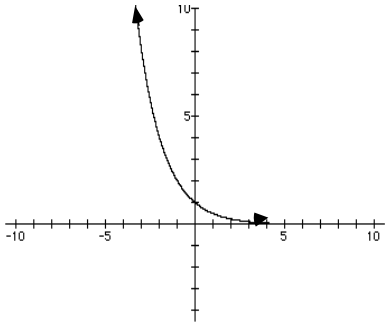
Graphing Exponential Functions

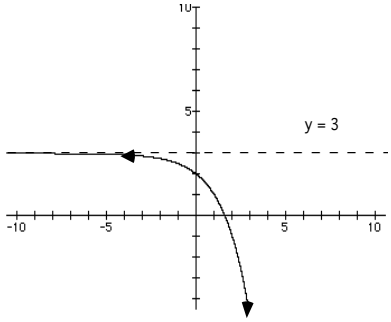
Graphs of the Form: $f(x) = a^x$

1) The point (0, 1), (1, a), $\left(-1, \frac{1}{a}\right)$ is on the graph.
2) If $a > 1$, f is an increasing function; If $0 < a < 1$, f is an decreasing function**.**
3) The x-axis is a horizontal asymptote.
4) The domain is $(-\infty, \infty)$and the range is $(0, \infty)$

Graph: $f(x) = 2^x$ $g(x) = 2^{-x}$ $h(x) = -2^x + 3$







Horizontal Asymptote: The line in which a graph approaches (gets closer and closer to)

Increasing Function: A function where as x-values increase so do the y-values.

Decreasing Function: A function where as x-values increase y-values decrease.

Laws of Exponents ?

Exponential Equations (TYPE 1)

Example 2: Solve

a) $\left(\frac{1}{3}\right)^x = 81$

b) $1.5^{x+1} = \left(\frac{27}{8}\right)^x$

The Natural Base e	$e \approx 2.71828.....$

Example 3: Use a calculator to evaluate each expression.

a) e^{-2} b) e^{-1} c) e^{1} d) e^{2}