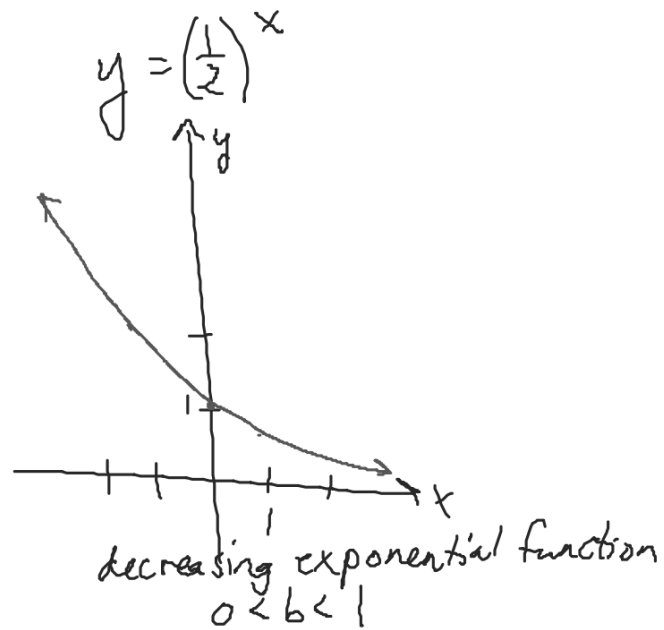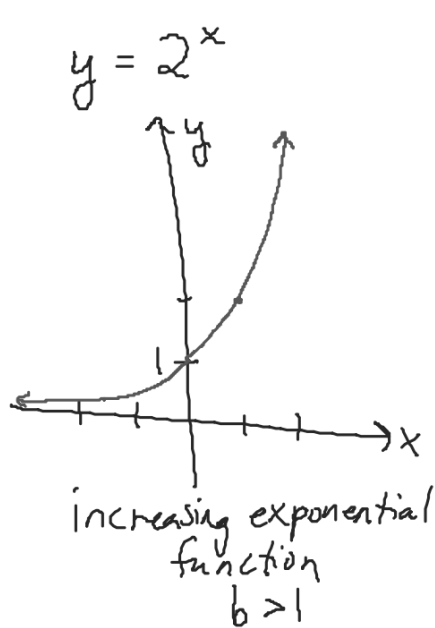# Exponential Functions

Exponential functions are continuous for all real numbers. The exponential function has an equation of the form $y = a \cdot b^x$ and is defined for $\{b \mid b > 0 \text{ and } b \neq 1\}$

Sketch functions for various values of b.

$y = 2^x$

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

increasing exponential
function
$b > 1$

decreasing exponential function
$0 < b < 1$

Laws of Exponents

$$a^{x+y} = a^x a^y$$

$$a^{x-y} = \frac{a^x}{a^y}$$

$$\left(a^x\right)^y = a^{xy}$$

$$\left(ab\right)^x = a^x b^x$$

If $f(x) = a^x$, consider its graph for a value of a greater than 1.
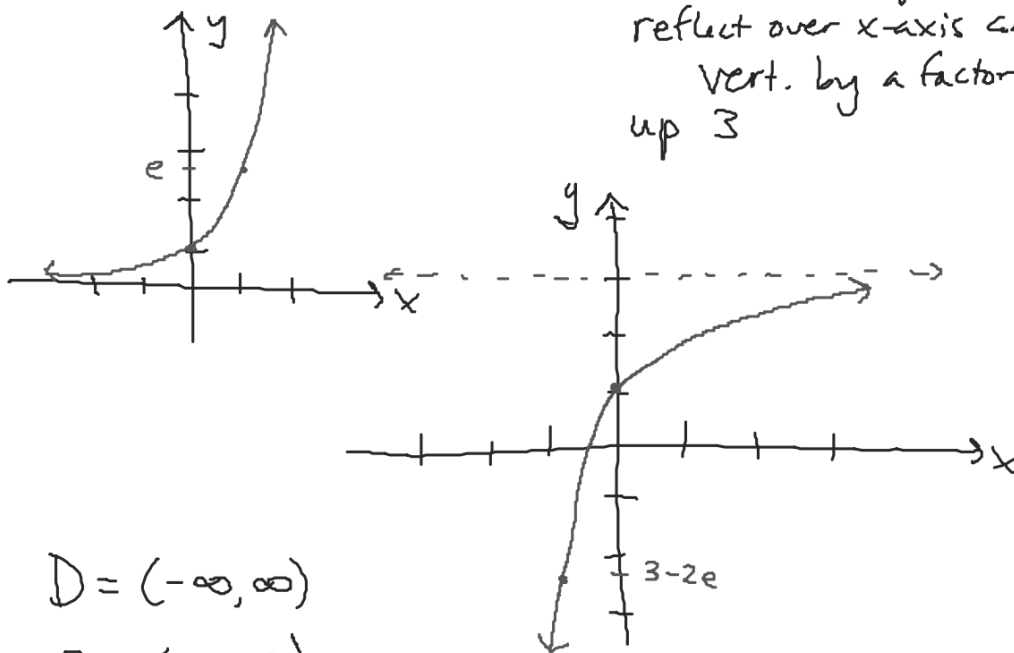Draw a tangent line to the curve at $x = 0$.

For what value of a is the slope of the tangent line 1?

e

Using transformations of the parent exponential
function to sketch the graph of $y=-2e^{-x}+3$
State the domain and range.

reflect over y-axis
reflect over x-axis and stretch
     vert. by a factor of 2
up 3

3−2e

$D = (-\infty, \infty)$

$R = (-\infty, 3)$