4.1 NOTES: Calculating Compound Interest:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

5% = .05

change % to a decimal

A = final amount

P= principal (initial investment)

r = annual (yearly) interest rate

n = # times interest is paid per year (compounded)

t = # of years

→See video in e-book for a further explanation of compound interest.

4.1 Notes: Exponential Functions

The **exponential function with base a** is defined for all real numbers **x** by:

$$f(x) = a^x, \text{ where a} > 0 \text{ and a} \neq 1.$$

→See video in e-book for introduction about exponential functions and an exploration link.

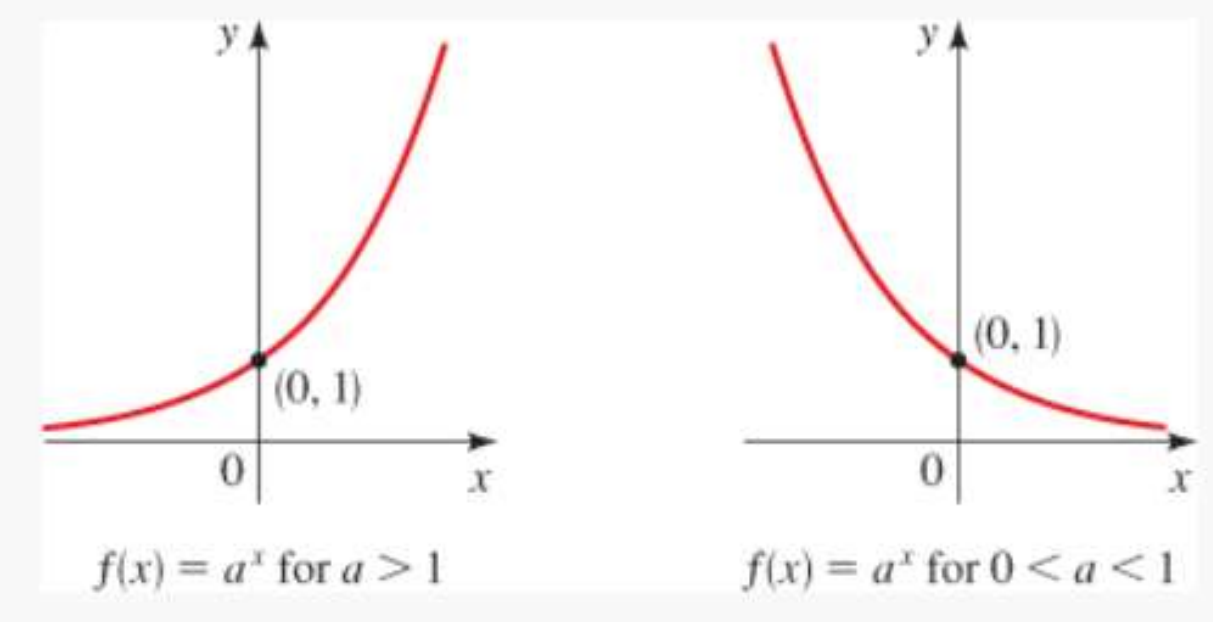
The line y=0 (x-axis) is an asymptote and the y-intercept is at (0, 1).

$f(x) = a^x$,

where a > 1

$f(x) = a^x$,

where $0 > a > 1$

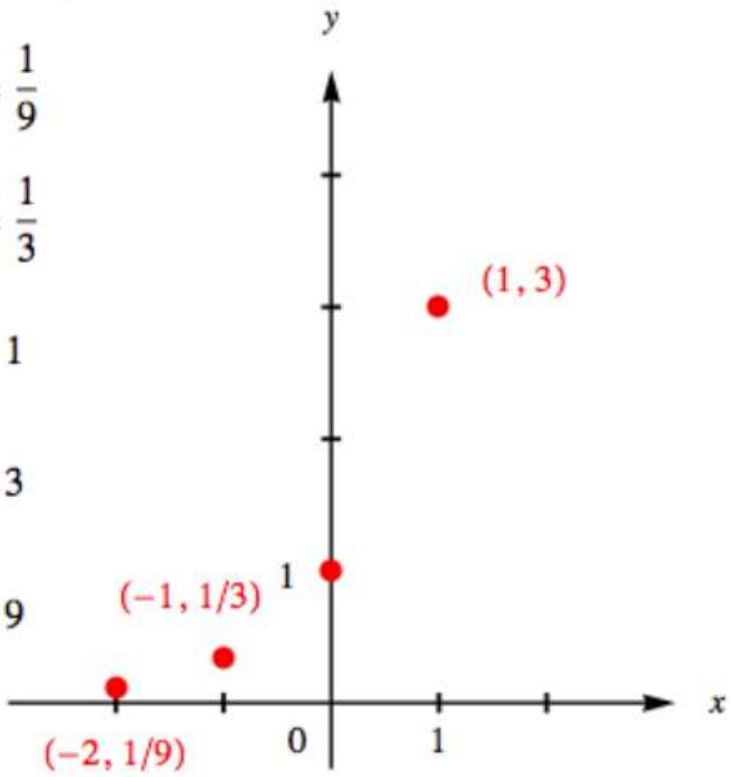


Domain is $(-\infty,\infty)$ and Range is $(0,\infty)$

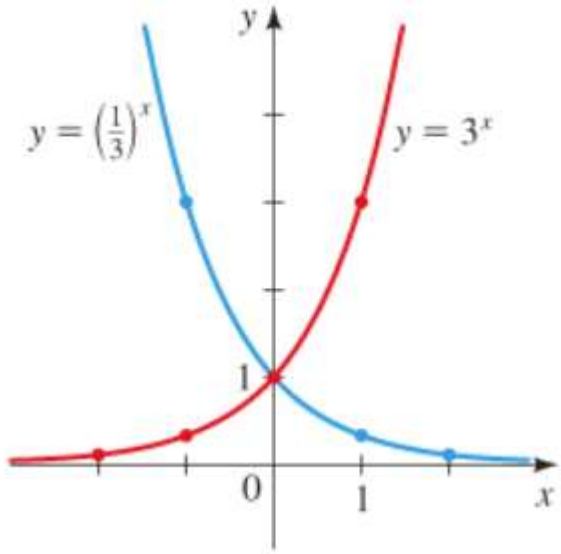
Calculate values and plot points to sketch a graph:

Reminder: $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

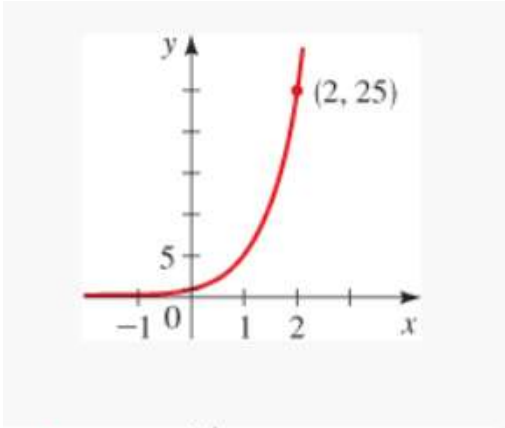
x	$f(x) = 3^x$
-2	$f(-2) = \frac{1}{9}$
-1	$f(-1) = \frac{1}{3}$
0	$f(0) = 1$
1	$f(1) = 3$
2	$f(2) = 9$



These graphs are reflections of each other across the y-axis:



Writing an equation given the graph:

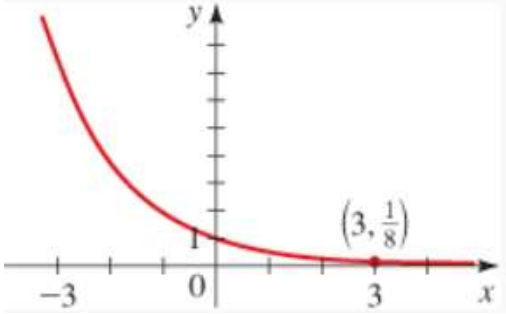


Example 1:

Given: $f(x) = a^x$ and $a > 0$.

From the graph $x = 2$ and $y = 25$ [same as $f(x) = 25$]

therefore $25 = a^2 \rightarrow a = 5$ so $f(x) = 5^x$



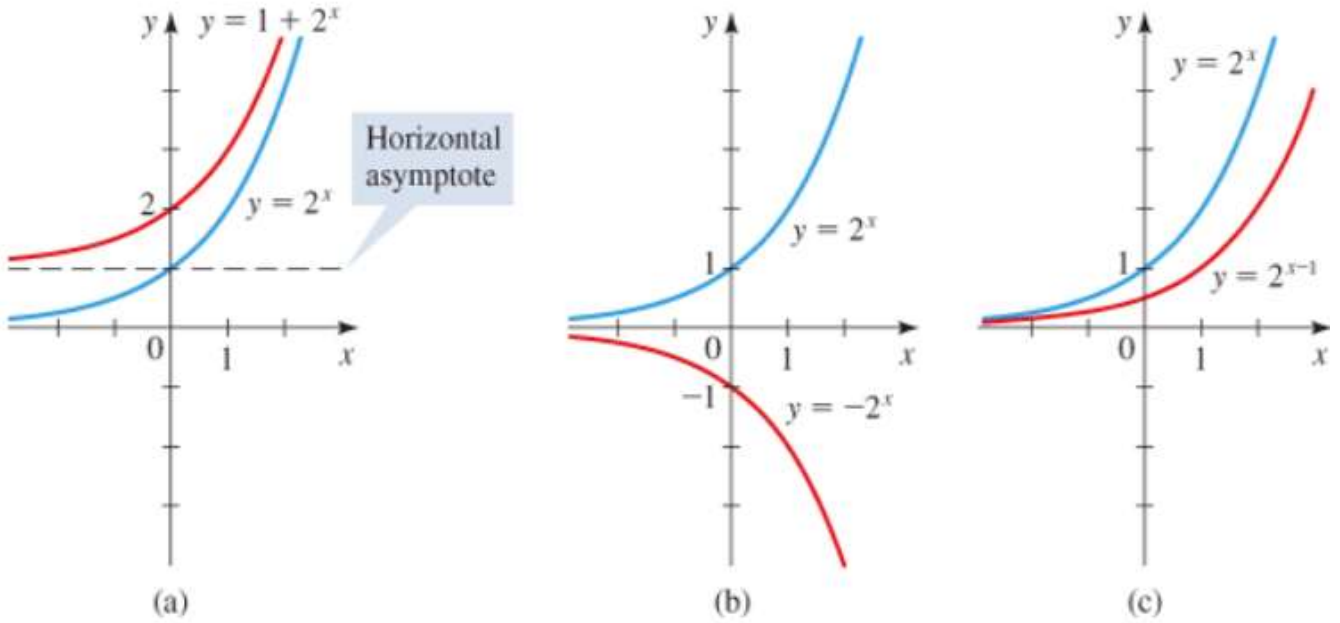
Example 2:

From the graph $x = 3$ and $y = \frac{1}{8}$

therefore $\frac{1}{8} = a^3 \rightarrow a = \frac{1}{2}$ so $f(x) = \left(\frac{1}{2}\right)^x$

See figure 2 and figure 3 in book for examples of transformations and an animations link that demonstrate transformations:

Figure 3



CLICK ON LINKS IN E-BOOK→

Animation: Vertical Shift of an Exponential Function