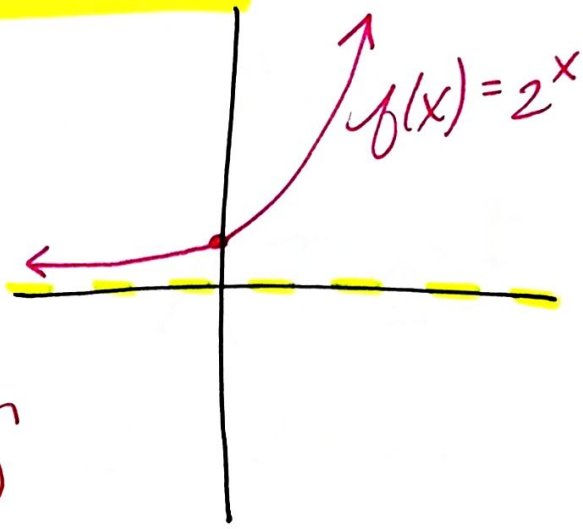
3.1 Exponential Functions

$f(x) = a \cdot 2^{x-h} + k$



a = stretches or compresses (y-values increase) (y-values decrease)

↔ h = horizontal shift (opp. direction of the sign)

↕ k = vertical shift

asymptote ⇒ $y = k$

Evaluate $f(x) = 9^x$ for:

$f(0) = 9^0 = 1$

$f(-1) = 9^{-1} = \frac{1}{9}$

$f\left(\frac{1}{2}\right) = 9^{\frac{1}{2}} = \sqrt[2]{9^1} = 3$

$f\left(-\frac{1}{2}\right) = 9^{-\frac{1}{2}} = \frac{1}{9^{\frac{1}{2}}} = \frac{1}{3}$

Formulas for compound interest are exponential functions.

Interval (yearly, monthly, daily, etc.)

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

Continuously

$$A = Pe^{rt}$$

P = initial investment
r = rate (as a decimal)
t = time (in years)
n = number of intervals per year
(monthly $\Rightarrow n = 12$)
A = ~~new/~~final worth of investment

$e = 2.718\ldots$
Euler's number
use e^x

ex: Calculate the worth of a $10,000 (P) investment at a 4% ($\rightarrow r = .04$) interest rate over 10 years ($t = 10$)

Compounded Daily $\rightarrow n = 365$

$$A = 10{,}000\left(1 + \frac{.04}{365}\right)^{365(10)}$$

$$A = \$14{,}917.92$$

Compounded Continuously

$$A = 10{,}000e^{.04(10)}$$

$$A = \$14{,}918.25$$