ex

$f(x) = \frac{1}{x-h}$ — Family of Functions - w/ same basic (x, y) relationship, same graph shape.

$f(x) = \frac{1}{x}$ — Parent Function - the function when $h=0$

h-value — Parameter - h-value. can change & changes graph but not shape.

(x, y) — Variables - $(x \,\&\, y) \rightarrow$ points on graph.

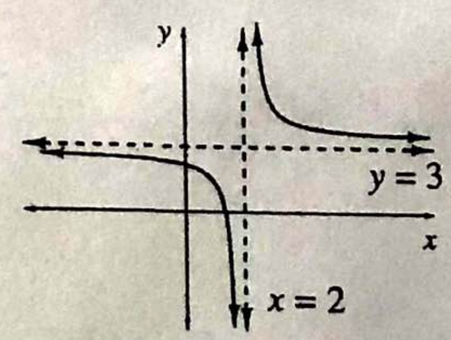
Asymptotes

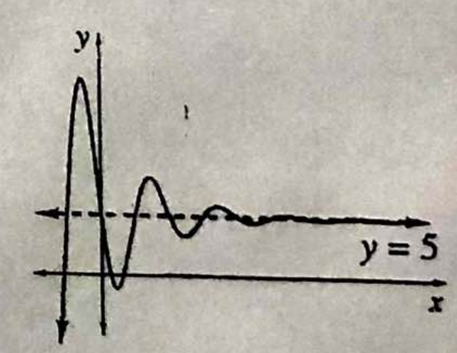
METHODS AND MEANINGS

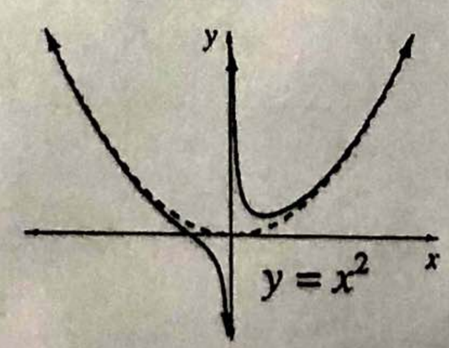
MATH NOTES

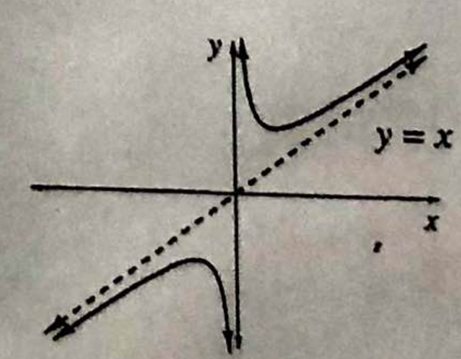
Graphs with Asymptotes

A mathematically clear and complete definition of an asymptote requires some ideas from calculus, but some examples of graphs with **asymptotes** should help you recognize them when they occur. In the following examples, the dotted lines are the asymptotes, and the equations of the asymptotes are given. In the two lower graphs, the y-axis, $x = 0$, is also an asymptote.









As you can see in the examples, asymptotes can be diagonal lines or even curves. However, in this course, asymptotes will almost always be horizontal or vertical lines. The graph of a function has a **horizontal asymptote** if, as you trace along the graph out to the left or right (that is, as you choose x-values farther and farther away from zero, either toward negative infinity or toward positive infinity), the distance between the graph of the function and the asymptote gets smaller and smaller.

A graph has a **vertical asymptote** if, as you choose x-coordinates closer and closer to a certain value, from either the left or right (or both), the y-coordinate gets farther away from zero, either toward infinity or toward negative infinity.

1.1.3

Be able to explain how modifying an equation modifies a graph.

8-23-19

Rational Functions

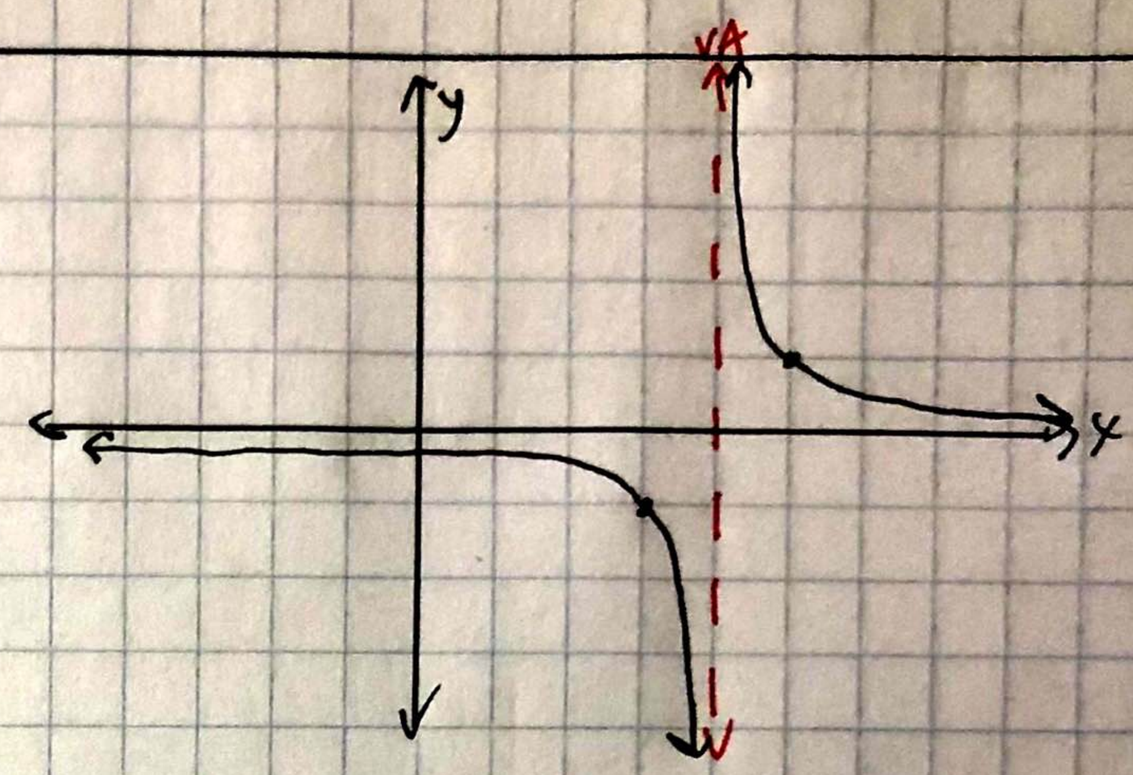
Graph

① $f(x) = \frac{1}{x-4}$

x	y
3.9	-10
4.1	10

VA: $x=4$

HA: $y=0$



Domain: $\mathbb{R}$, $x \neq 4$

$x<4$ or $x>4$

$(-\infty,4) \cup (4,\infty)$

Range: $\mathbb{R}$, $y \neq 0$

$y<0$ or $y>0$

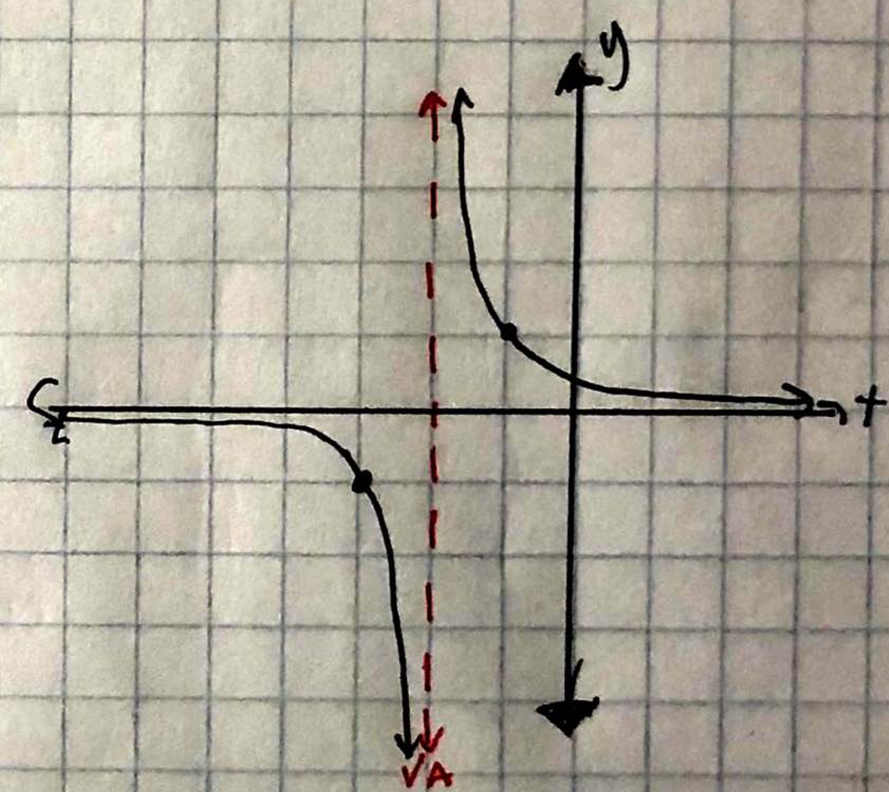
$(-\infty,0) \cup (0,\infty)$

② $f(x) = \frac{1}{x+2}$

x	y
-1.9	10
-2.1	-10

VA $x=-2$

HA: $y=0$



domain: $\mathbb{R}$, $x \neq -2$

$(-\infty,-2) \cup (-2,\infty)$

Range: $\mathbb{R}$, $y \neq 0$

$(-\infty,0) \cup (0,\infty)$

Parameters vs Variables

(33) a) same: HA, same range, double LS, functions, no x-int, decreasing, always VA & HA

differences: domains, VA, h-values

b) parameters: h-gave us the VA → domain

variables: represent points on graph.

c) exponential family. $y=b^x$

linear family $y=mx+b$

quadratic family $y=x^2$