x and y intercepts of Rational Functions:

Y-Intercepts: the result of replacing x with zero.

Find the y-intercepts of each function

1. $y = \frac{x^2 - 9x + 20}{x^2 + 7x + 10}$

y-int = 20/10 = 2

2. $y = \frac{4x^2 + 3x}{2x^2 - 7x + 1}$

y-int = 0/1 = 0

3. $y = \frac{x^2 - 4}{2x^2 + 6x}$

y-int = -4/0 which
is undefined so,
there is no y-int.

NO y-int

In general, the y-intercepts of a Rational Function is the:

Ratio of the Constants

A graph can have at most ONE y-intercept.

X-Intercepts: the result of replacing y with zero.

This means you are setting the ratio equal to zero and solving for x.

The only way a fraction equals zero is if the NUMERATOR equals zero.

In general, the x-intercepts of a Rational Function are the:

Zeros of the numerator (as long as they don't match zeros of the denominator), otherwise,these values of x are HOLES.

A graph can have multiple x-intercepts.

find the x-intercepts of each function.

1. $y = \dfrac{x^2 - 9x + 20}{x^2 + 7x + 10}$

$(x-5)(x-4)$

$(x+5)(x+2)$

x-int: 5, 4

2. $y = \dfrac{x^2 + 4}{3x^2 + 6x} = \dfrac{(x+2)(x-2)}{3x(x+2)}$

x-int: 2

3. $y = \dfrac{4x^2 + 3x}{2x^2 - 7x + 1}$

$x(4x+3)$

x-int: $-3/4$, 0

4. $y = \dfrac{3x^2 + 5}{x^2 - 2x - 3}$

x-int: NONE

Because $3x^2+5$ will never be zero

You can now finish Hwk #4

Practice Sheet Sec 9-3

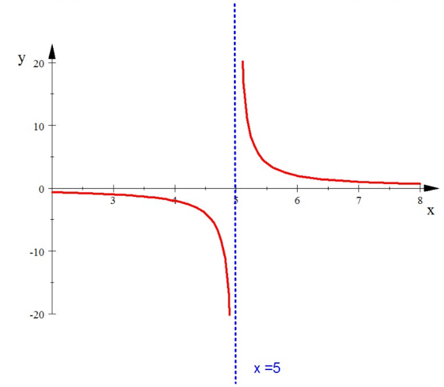
What a graph does when it approaches a Vertical Asymptote:

$y = \dfrac{2}{x - 5}$

VA: x = 5

the graph either increases or decreases without bound as you approach a VA.

the y-value either becomes larger and larger positive or larger and larger negative.



to the left of x = 5

x	y
4.9	-20
4.99	-200
4.999	-2000

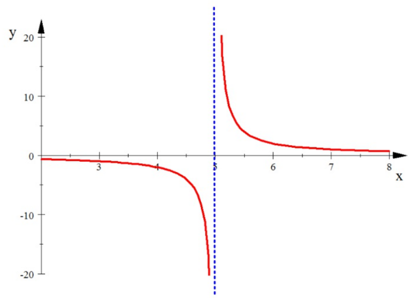
the function is deceasing as it approaches the VA from the left.

to the right of x = 5

x	y
5.1	20
5.01	200
5.001	2000

the function is inceasing as it approaches the VA from the right.

$$y = \frac{2}{x-5}$$



You can determine the behavior near VA by doing SIGN ANALYSIS:

$$y = \frac{2}{x-5}$$

to the left of x = 5

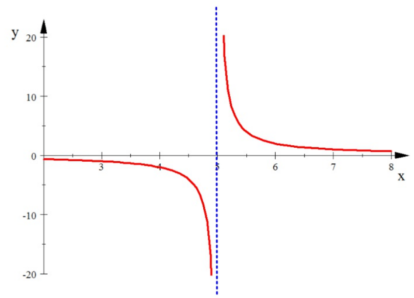
x	y
4.9	$\frac{+}{-}$ = NEG → down

A negative result means the y-values are getting more and more negative... the graph is going DOWN

to the right of x = 5

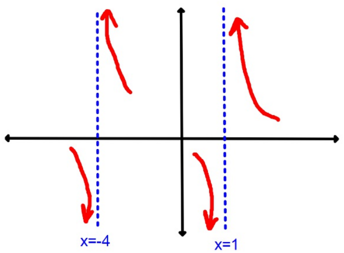
x	y
5.1	$\frac{+}{+}$ = POS → up

A negative result means the y-values are getting more and more Positive... the graph is going UP



Determine the behavior of the graph on either side of it's vertical asymptotes, x = 1 and x = -4

$$y = \frac{x+2}{(x-1)(x+4)}$$



behavior on left of x = -4

x	y
-4.1	$\frac{-}{- \cdot -}$ = $\boxed{\text{neg}}$

this means the graph is decreasing on the left.

behavior on right of x = -4

x	y
-3.9	$\frac{-}{- \cdot +}$ = $\boxed{\text{pos}}$

this means the graph is increasing on the right.

behavior on left of x = 1

x	y
0.9	$\frac{+}{- \cdot +}$ = $\boxed{\text{neg}}$

this means the graph is decreasing on the left.

behavior on right of x = 1

x	y
1.1	$\frac{+}{+ \cdot +}$ = $\boxed{\text{pos}}$

this means the graph is increasing on the right.

Determine the behavior of the graph on either side of it's vertical asymptotes, x = 2 and x = -2

$$y = \frac{x-5}{(x-2)(x+2)} = \frac{x-5}{x^2-4}$$

Left x=-2

x	y
-2.1	$\frac{-}{- \cdot -}$ NEG ↓ DOWN

Right x=-2

x	y
-1.9	$\frac{-}{- \cdot +}$ POS ↓ UP

Left of x=2

x	y
1.9	$\frac{-}{- \cdot +}$ POS → UP

RT x=2

x	y
2.1	$\frac{-}{+ \cdot +}$ NEG → DOWN