Y-intercepts of a Rational Function:

Replace x with zero

Ratio of the Constants

These are the ONLY places a graph can touch or cross the x and y axes

and you MUST pass through or touch these points.

X-intercepts of a Rational Function:

Replace y with zero

The zeros of the numerator
(unless they are also zeros of the denominator)

Horizontal Asymptotes:

1. Ratio of leading coefficients if degrees of numerator and denominator are the same.
2. Y=0 if degree of denominator > degree of numerator
3. No HA if degree of numerator > degree of denominator

Horizontal asymptotes are the end-behavior of a graph, they don't tell us what the middle of the graph looks like. A graph CAN cross a HA, it's at the ends of the graph that it will approach the HA but never quite reach.

Vertical Asymptotes:

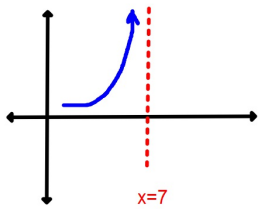
Zeros of the denominator if they don't match zeros of the numerator.

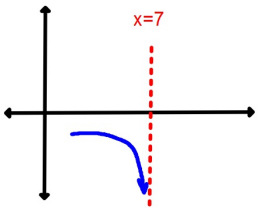
Unlike a HA a graph can NEVER touch or cross a VA. These are values that make the denominator zero which means the function becomes undefined at that point. These values for x are not in the Domain of the function.

A graph behaves one of two ways when it approaches a vertical asymptote.

Given a graph has a VA at x = 7 and you are approaching from the left.

The graph will either
increase without bound or decrease without bound



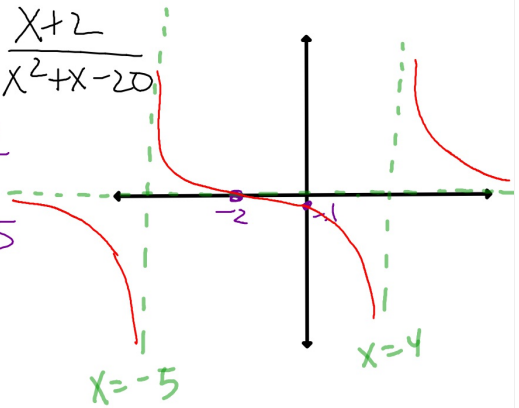


Graph this rational function:

$y = \frac{(x+2)}{(x-4)(x+5)} = \frac{x+2}{x^2+x-20}$

y-int: $\frac{2}{-20} = -.1$ x-int: $x = -2$

HA: $y = 0$ VA: $x = 4, -5$

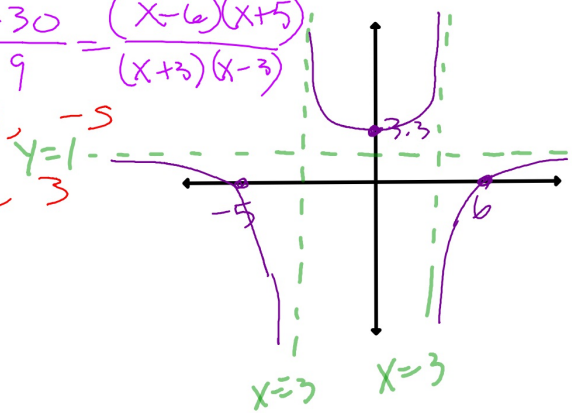


Graph this rational function:

$y = \frac{x^2-x-30}{x^2-9} = \frac{(x-6)(x+5)}{(x+3)(x-3)}$

y-int: $3.\overline{3}$ x-int: $6, -5$

HA: $y = 1$ VA: $-3, 3$



Looking ahead to Chapter 7: Below are skills that will be used again in Chapter 7.

Simplify each:

1. $\sqrt{98}$

$= \sqrt{49 \cdot 2}$

$= 7\sqrt{2}$

2. $\sqrt{112}$

$= \sqrt{16 \cdot 7}$

$= 4\sqrt{7}$

or $= \sqrt{4 \cdot 28}$

$= 2\sqrt{28}$

$= 2\sqrt{4 \cdot 7}$

$= 2 \cdot 2\sqrt{7}$

$= 4\sqrt{7}$

$= 2 \cdot 2\sqrt{7} = 4\sqrt{7}$