11-3: Attributes of Rational Graphs

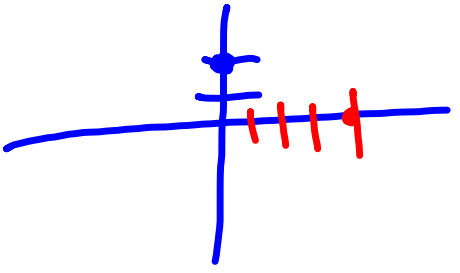
Objectives:

1. I can find the x and y intercepts of a rational function
2. I can find the vertical and horizontal asymptotes of a rational function

X and Y Intercepts

Y intercepts, x = 0

$$f(x)=\frac{3x-12}{x^2-5x-6}$$



X intercepts, y = 0

$$f(x)=\frac{3x-12}{x^2-5x-6}$$

$$0=\frac{3x-12}{x^2-5x-6}$$

x^2-5x-6

$\cdot\, x^2-5x-6$

num = 0

$$0=3x-12$$

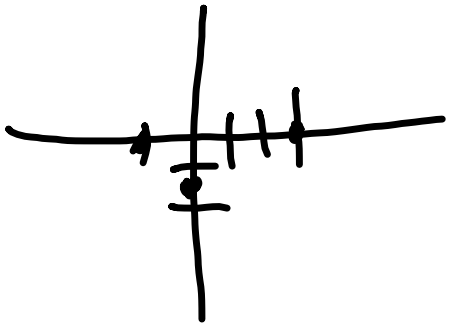
$$x=4$$

Find the x and y intercepts of the following functions:

$$f(x)=\frac{(x-3)(x+1)}{x+2} \qquad \frac{(0-3)(0+1)}{0+2} = \frac{-3}{2}$$

$$0=(x-3)(x+1)$$

$$x=3,-1$$

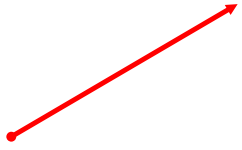


$$f(x)=\frac{3x-5}{(x-2)(x-3)}$$

Review of Vertical Asymptotes

$$f(x) = \frac{2}{x+3}$$

excluded value



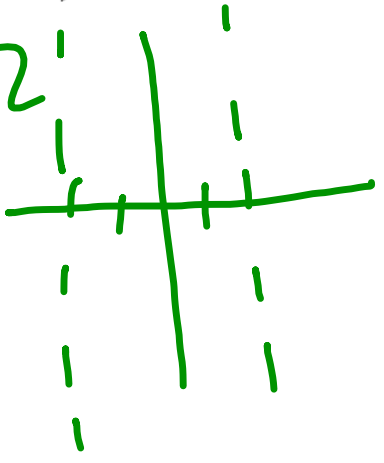
Set the denominator = 0, then solve for x

Find the vertical asymptotes:

a. $y = \dfrac{3x-5}{(x-2)(x+2)}$

VA: 2, -2

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



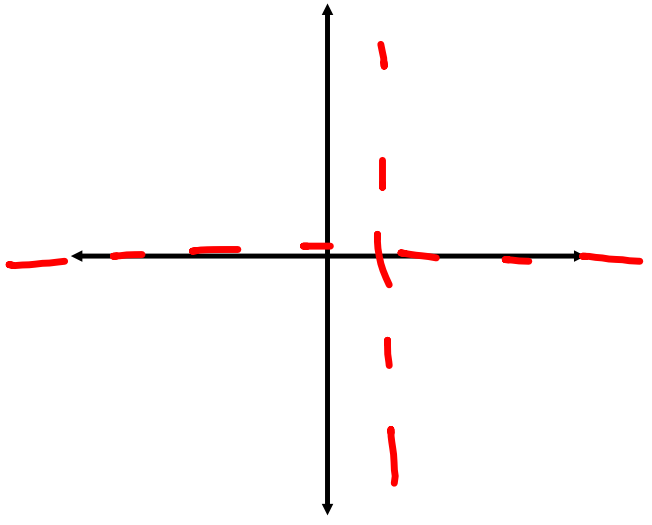
c. $y = \dfrac{5x}{x+2}$

To find the *horizontal asymptote* (HA) - compare the degrees of the numerator and denominator if:

top heavy: oblique/diagonal
bottom heavy (HEB): $y = 0$
equal (HA): divide leading coefficients

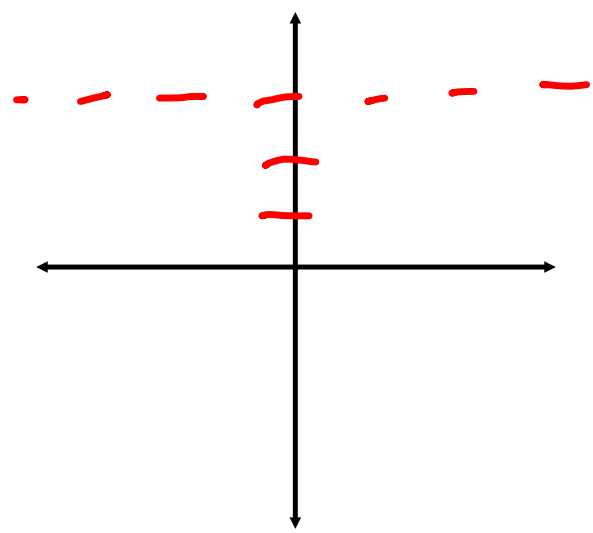
What kind of end behavior will the following have?

$$f(x) = \frac{-3}{x-1}$$



$$f(x) = \frac{3x-7}{x-2}$$

$\frac{3}{1} = 3$



Identify the x and y intercepts, vertical and horizontal asymptotes, end behavior, and then graph.

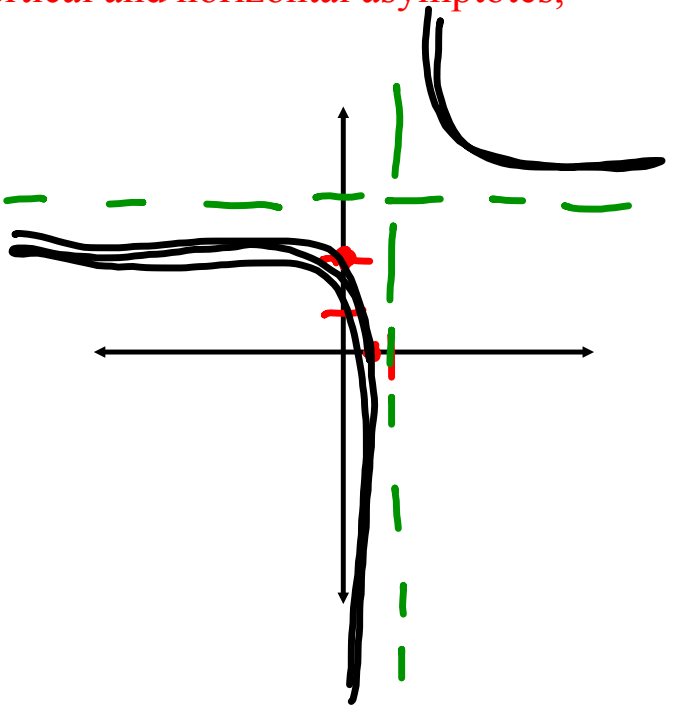
$$f(x) = \frac{3x-2}{x-1}$$

y-int: 2

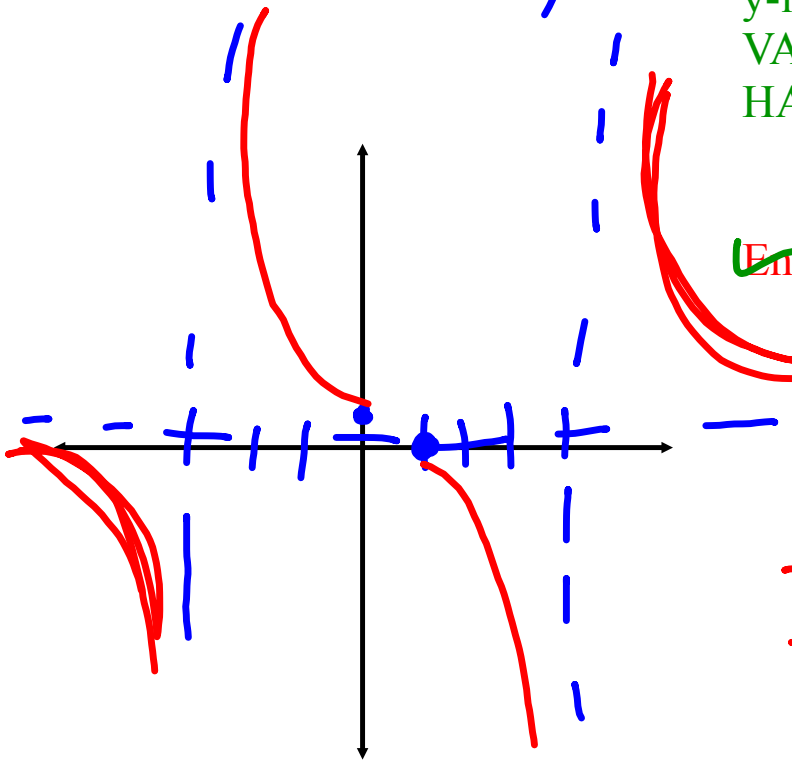
x-int: $\frac{2}{3}$

VA: 1

HA: 3



$$f(x)=\frac{(x-1)}{(x-4)(x+3)}$$



Domain
Range
x-intercepts 1
y-intercepts 1, 12
VA -3, 4
HA 0

End Behavior

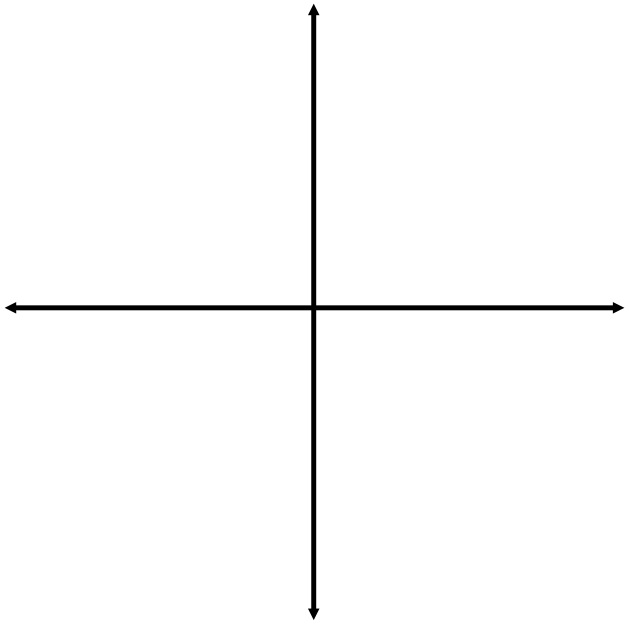
$$\frac{1}{x-4}=0$$

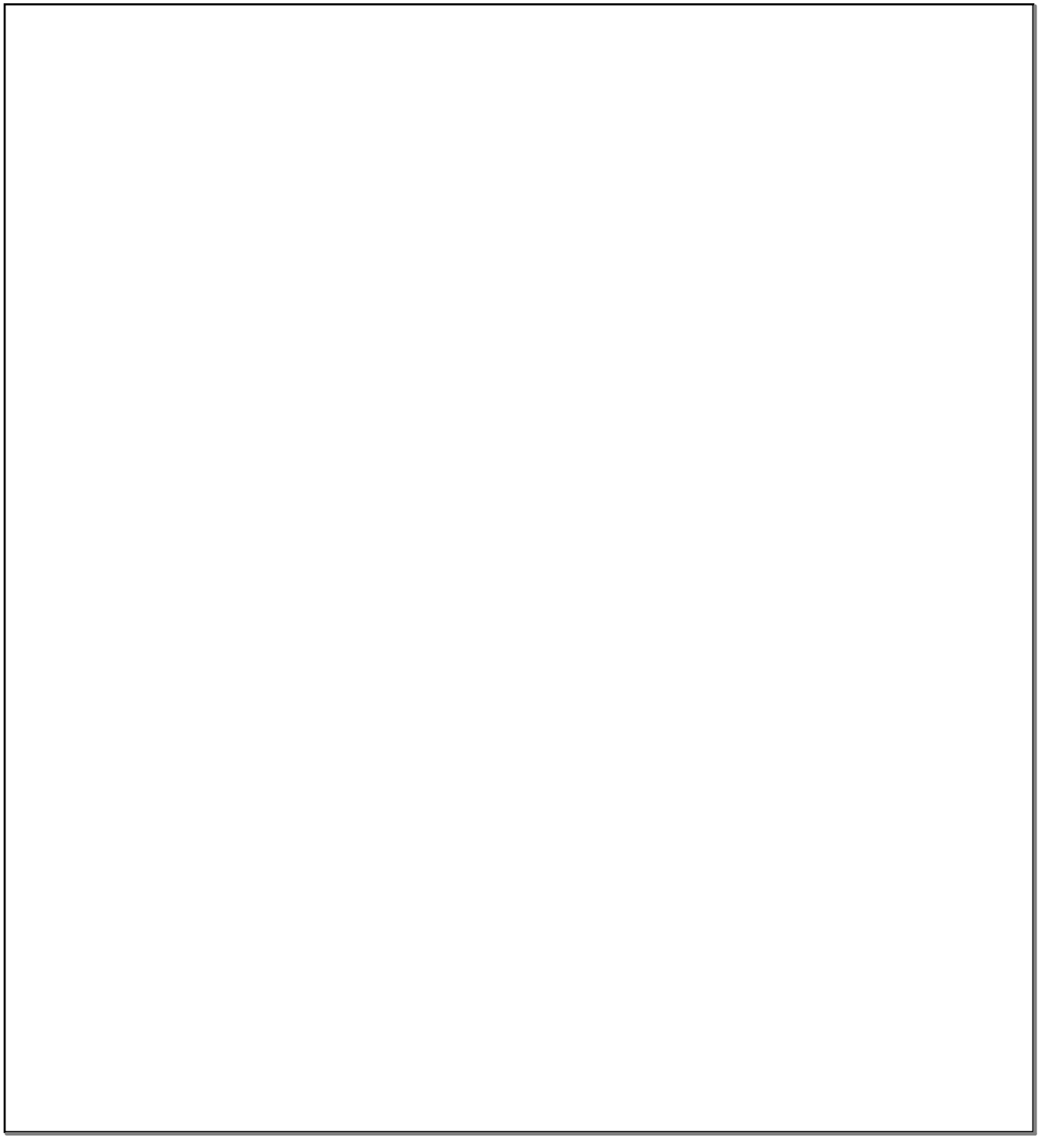
$$1=0$$

Graph and Analyze $f(x)=\dfrac{x+1}{(x+3)(x-4)}$

Domain
Range
x-intercepts
y-intercepts
VA
HA

Asymptote Behavior



End Behavior

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