

Tell me everything you know about rational functions
(hint: in case you don't remember, rational
functions are quotients with a polynomial in the
numerator and denominator like $\frac{x^2-4}{x+3}$)

Unit 1 Day 7 (1.7):
Rational Function End Behavior

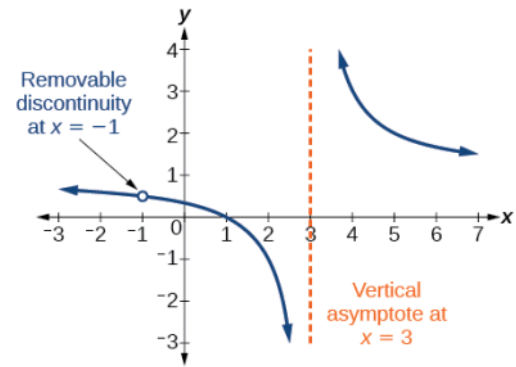
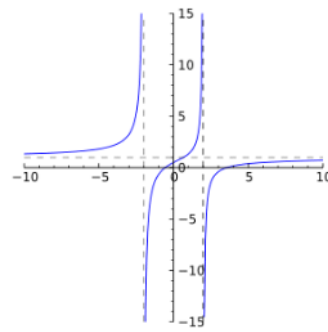
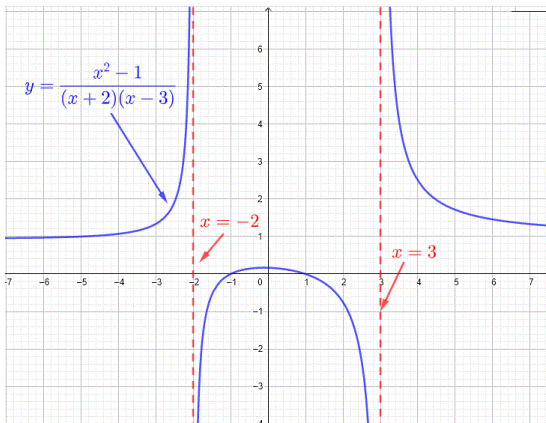
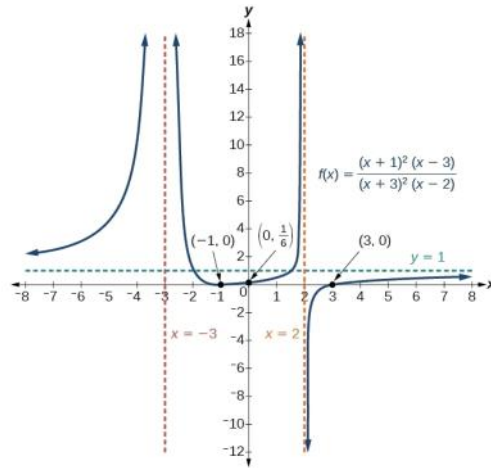
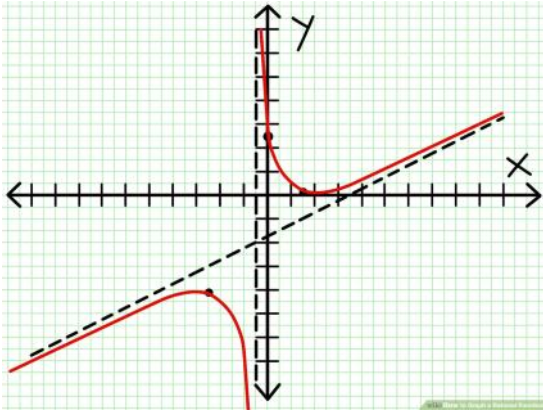
Quiz Today!

Homework:
Rational Function End Behavior

Rational Functions

A rational function is a function that can be written as the quotient of two polynomial functions.

The function $f(x) = \frac{n(x)}{d(x)}$ is rational if $n(x)$ and $d(x)$ are polynomials



Finding Horizontal Asymptotes

To find the horizontal asymptote, compare the degree of the numerator and denominator. Three cases arise:

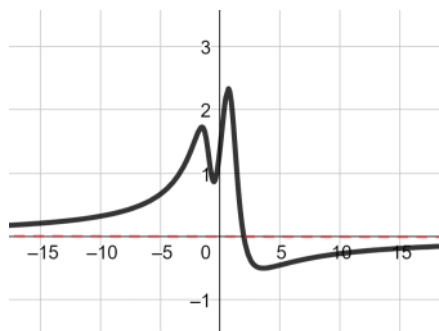
Case	Degree		Degree	Asymptote
1	Numerator		Denominator	
2	Numerator		Denominator	
3	Numerator		Denominator	

Rational functions can have at most ONE HA

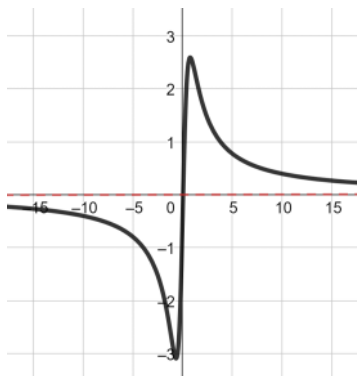
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$$f(x) = \frac{5x^2 + 10x - 6x^3 + 7}{5 + x + 2x^4}$$



$$g(x) = \frac{16x - 1}{2 + 4x^2}$$



$$h(x) = \frac{3 - 6x + 10x^2}{4 - 5x^3}$$

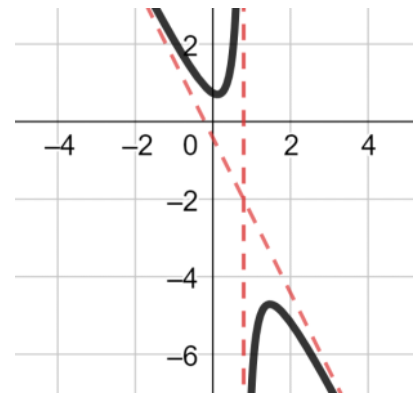
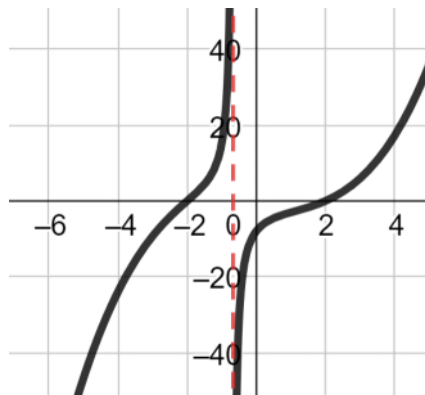
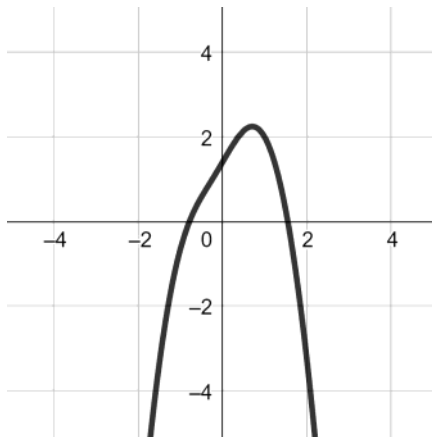


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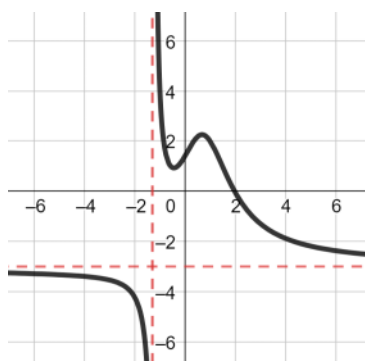
$$f(x) = \frac{5x^2 + 10x - 6x^4 + 7}{5 + x + 2x^2}$$

$$g(x) = \frac{x^4 - 16}{2 + 3x}$$

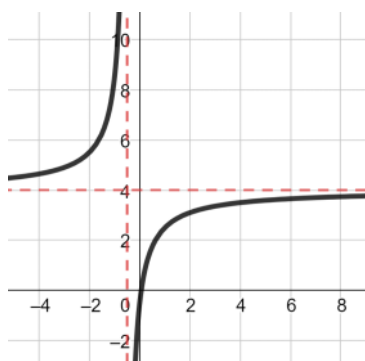
$$h(x) = \frac{3 - 6x + 10x^2}{4 - 5x}$$



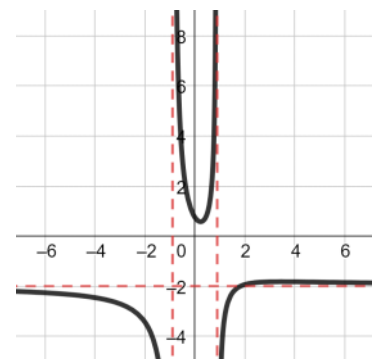
$$f(x) = \frac{5x^2 + 10x - 6x^3 + 7}{5 + x + 2x^3}$$



$$g(x) = \frac{16x - 1}{2 + 4x}$$



$$h(x) = \frac{3 - 6x + 10x^2}{4 - 5x^2}$$



Find the equation of the horizontal asymptote, if there is one.
Describe the end behavior using limit notation.

$$\text{A) } f(x) = \frac{16x+1}{4x^2-2}$$

$$\text{B) } g(x) = \frac{16x^2+1}{4x^2-2}$$

$$\text{C) } h(x) = \frac{16x^3+1}{4x^2-2}$$

Write the equation of a rational function with the following properties

A)

- $\lim_{x \rightarrow -\infty} f(x) = -\infty$
- $\lim_{x \rightarrow \infty} f(x) = -\infty$
- Degree of Denominator: 2

B)

- Has a slant asymptote
- Slant asymptote has a slope of -3
- The leading coefficient of the polynomial in the numerator is 6