1.2 Functions and Their Properties
Vertical and Horizontal Asymptotes
Target 1A: Analyze functions using specific properties

Review of Prior Concepts

Identify any discontinuities for $f(x) = \frac{x^2+7x+10}{x^2-4x-12}$ and describe the type of discontinuity.

$f(x) = \frac{(x+5)(x+2)}{(x-6)(x+2)}$

$= \frac{(x+5)(x+2)}{(x-6)(x+2)}$

↑ non-removable @ $x = 6$

↳ removable discont. @ $x = -2$

More Practice

Discontinuities

http://www.ck12.org/Analysis/Discrete-and-Continuous-Functions/lesson/Continuity-and-Discontinuity-PCALC/

https://www.youtube.com/watch?v=2n5VzMFJQVY

Vertical & Horizontal Asymptotes

RECALL:

Vertical Asymptotes – non-removable discontinuity found from denominator set equal to zero (after common factors have been removed).

Horizontal Asymptotes -- occur when end behavior approaches a #, *c*. H.A. is @ $y = c$.

$$\textit{NOTATION: } \lim_{x\to\infty} f(x) = c \qquad \text{or} \qquad \lim_{x\to-\infty} f(x) = c$$

Graph each function. Find vertical asymptotes algebraically & horizontal asymptotes graphically (if any).

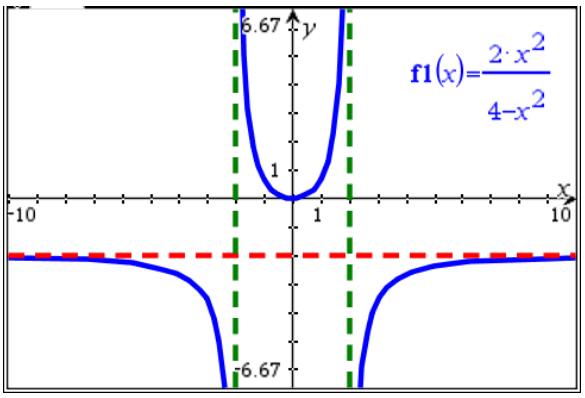
Example 1: $g(x) = \frac{2x^2}{4-x^2}$

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

$2-x=0 \quad 2+x=0$

$2=x \quad x=-2$

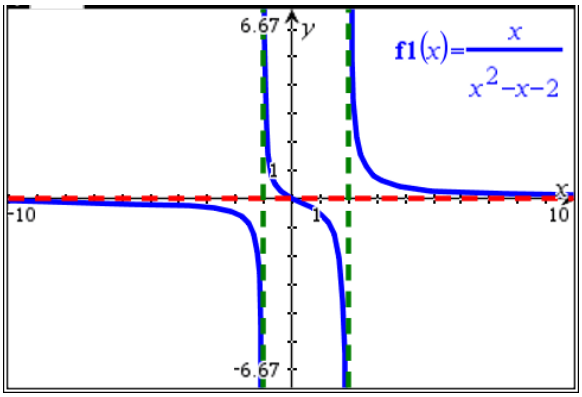
V.A. @ $x=-2, x=2$



H.A. @ $y=-2$ b/c

$\lim_{x\to\infty} g(x) = -2$, $\lim_{x\to-\infty} g(x) = -2$

Example 2: $f(x) = \frac{x}{x^2-x-2}$



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

$x-2=0 \quad x+1=0$

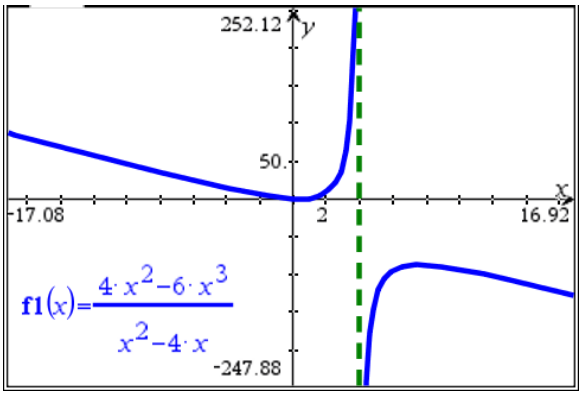
$x=2 \quad x=-1$

V.A. @ $x=-1, x=2$

H.A. @ $y=0$ b/c

$\lim_{x\to\infty} f(x)=0$, $\lim_{x\to-\infty} f(x)=0$

Example 3: $h(x) = \frac{4x^2-6x^3}{x^2-4x}$



$h(x) = \frac{x^2(4x-6)}{x(x-4)}$

$= \frac{x(x)(4x-6)}{x(x-4)}$

$= \frac{x(4x-6)}{x-4}$

@ hole $x=0$

$x-4=0$

$x=4$

V.A. @ $x=4$

No H.A. b/c

$\lim_{x\to\infty} f(x)=-\infty$, $\lim_{x\to-\infty} f(x)=\infty$

More Practice

Vertical Asymptotes

http://www.purplemath.com/modules/asymtote.htm

https://www.youtube.com/watch?v=h910JbhzecI

Homework Assignment

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