AP Precalc

Write your questions and thoughts here!

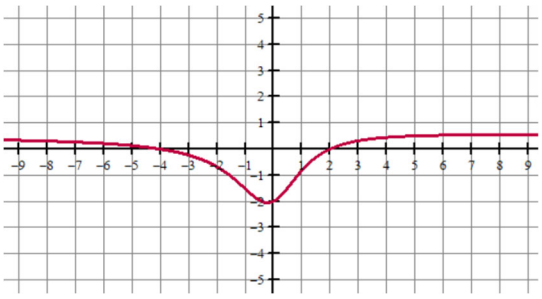
1.8 Rational Functions & Zeros

1.8 Notes

Zeros

Example 1:

$$f(x) = \frac{x^2 + 2x - 8}{2x^2 + 4}$$



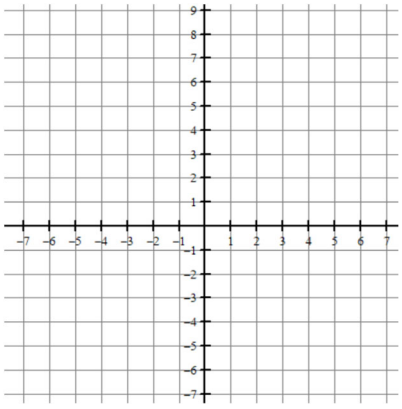
Domain:

Zero(s):

Holes

Example 2:

$$g(x) = \frac{x^2 - x - 12}{x - 4}$$



Domain:

Hole(s):

Zero(s):

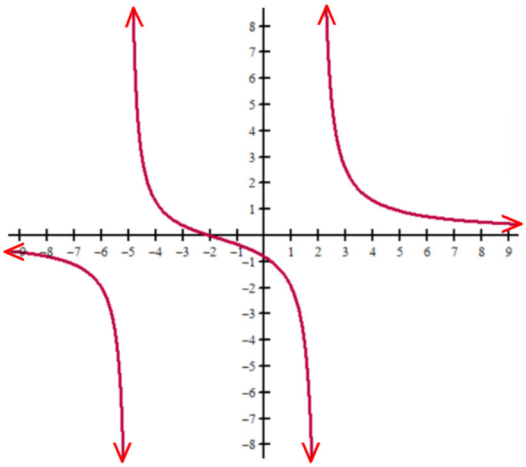
Zeros

Let f be the rational function $f(x) = \frac{N(x)}{D(x)}$ where N and D have no common factors. The zeros of the rational function occur when $N(x) = 0$ for all x in the domain of f.

Vertical Asymptotes

Example 3:

$$f(x) = \frac{4x + 8}{x^2 + 3x - 10}$$



Domain:

Hole(s):

Zero(s):

Vertical Asymptote(s):

Write your questions and thoughts here!

Rational Functions

Example 4:

$$h(x) = \frac{x^2 - 9}{x^2 - 2x - 3}$$

Hole(s):

Zero(s):

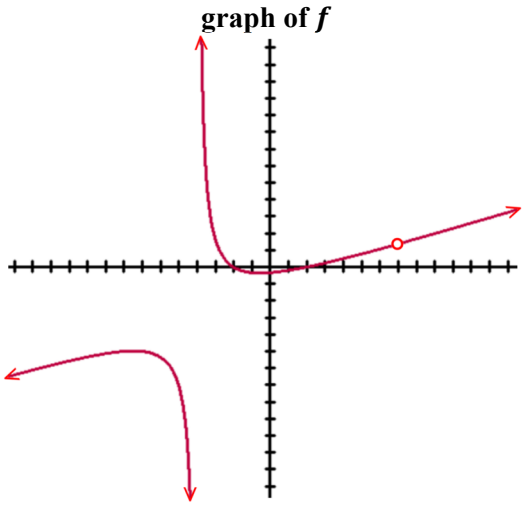
Domain:

Vertical Asymptote(s):

Horizontal Asymptote:

y-intercept:

Example 5:



Hole(s):

Zero(s):

Vertical Asymptote(s):

Horizontal Asymptote:

y-intercept (estimate):

Domain:

Sign Table for Example #5

x	$-\infty < x < -4$	-4	$-4 < x < -2$	-2	$-2 < x < 2$	2	$2 < x < 7$	7	$7 < x < \infty$
$f(x)$									

1.8 Rational Functions and Zeros

AP Precalculus

1.8 Practice

Find the zeros of the following rational function if one exists.

1. $f(x) = \frac{x-1}{x^2-9}$

2. $d(t) = \frac{(t+3)(t-1)}{4t+12}$

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

4. $r(x) = \frac{x-1}{x}$

5.

x	$-\infty < x < -3$	-3	$-3 < x < 5$	5	$5 < x < \infty$
$f(x)$	Positive	DNE	Negative	0	Positive

6. $c(n) = \frac{n^2+5n}{n^2-25}$

7.

x	$-\infty < x < 1$	1	$1 < x < 6$	6	$6 < x < \infty$
$g(x)$	Negative	0	Negative	0	Positive

Use the rational function to answer the following.

8.

$$f(x) = \frac{x^2 - 2x - 24}{x - 6}$$

a. Domain:

b. Hole(s):

c. Zero(s):

d. Vertical Asymptote(s):

e. Horizontal Asymptote:

f. *y*-intercept:

9.

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

a. Domain:

b. Hole(s):

c. Zero(s):

d. Vertical Asymptote(s):

e. Horizontal Asymptote:

f. *y*-intercept:

Use the rational function to answer the following.

10.

$$f(x) = \frac{x+2}{3x^2+6x}$$

a. Domain:

b. Hole(s):

c. x-intercept(s):

d. Vertical Asymptote(s):

e. Horizontal Asymptote:

f. y-intercept:

11.

$$h(t) = \frac{t^3-2t^2}{t^2+3t-18}$$

a. Domain:

b. Hole(s):

c. Root(s):

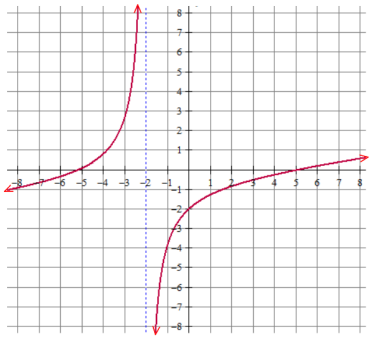
d. Vertical Asymptote(s):

e. Horizontal Asymptote:

f. y-intercept:

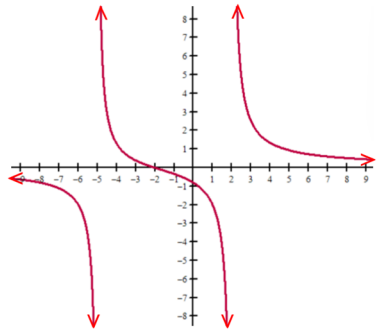
Use the graph to create a sign table.

12.



x	$-\infty < x < -5$	-5	$-5 < x < -2$	-2	$-2 < x < 5$	5	$5 < x < \infty$
$f(x)$							

13.



x	$-\infty < x < -5$	-5	$-5 < x < -2$	-2	$-2 < x < 2$	2	$2 < x < \infty$
$h(x)$							

Multiple Choice

14. The function f is given by $f(x) = \frac{x^2+2x-24}{4-x}$. Which of the following describes the function f ?

(A) The graph of f has an x-intercept at $x = -6$ and a vertical asymptote of $x = 4$.

(B) The graph of f has an x-intercept at $x = -6$ and a hole at $x = 4$.

(C) The graph of f has an x-intercept at $x = -6$ and a vertical asymptote of $x = -4$.

(D) The graph of f has an x-intercept at $x = -6$ and a hole at $x = -4$.

(E) The graph of f has x-intercepts at $x = -6$ and $x = 4$.

For questions 15 and 16 use the following table.

x	$-\infty < x < -3$	-3	$-3 < x < 0$	0	$0 < x < 2$	2	$2 < x < \infty$
$f(x)$	positive	0	negative	undefined	negative	0	positive

15. Which of the following must be true for the function f ?

(A) The graph of f has a maximum at $x = -3$ and a minimum at $x = 2$.

(B) The graph of f has a minimum at $x = -3$ and a maximum at $x = 2$.

(C) f has exactly two distinct real zeros.

(D) f has exactly three distinct real zeros.

(E) The graph of f has a vertical asymptote at $x = 0$.

16. Which of the following could be an expression for $f(x)$?

(A) $\frac{x(x+3)(x-2)}{x}$

(B) $\frac{x(x-3)(x+2)}{x}$

(C) $\frac{x}{x(x+3)(x-2)}$

(D) $\frac{x}{x(x-3)(x+2)}$

(E) None of the above