

Pre-Calculus
Graphing Rational Functions

Name _____
Hour _____

For the following functions, find:

- (a) the x-intercepts, y-intercepts
- (b) the vertical asymptote(s)
- (c) the horizontal asymptote
- (d) the holes
- (e) any additional points needed
- (f) then, graph the function.

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

x	y
5	-4/3
5	4/3

VA: ~~x~~ x = -1, 1 Holes: none
 X-int: 0 y-int: 0 HA: y = 0

2. $y = \frac{8}{x^2-x-6} = \frac{8}{(x-3)(x+2)}$

x	y
-1	-2
1	4/3
-3	4/3
-4	5/3
4	4/3
5	-5

X-int: ~~X~~ none VA: x = 3, x = -2
 y-int: $\frac{8}{-6} = \frac{4}{3}$ HA: y = 0

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

HA: y = 0 y-int: -9
 VA: none x-int: 3, -3
 Hole: none

$y = \frac{x^2-5x+6}{x^2-4x+3} = \frac{(x-3)(x-2)}{(x-1)(x-3)}$

VA: x = 1
 Hole: x = 3 $\frac{3-2}{3-1} = \frac{1}{2} (3, \frac{1}{2})$
 HA: y = 1

5. $y = \frac{x^2+11x+18}{2x+1} = \frac{(x+2)(x+9)}{2x+1}$

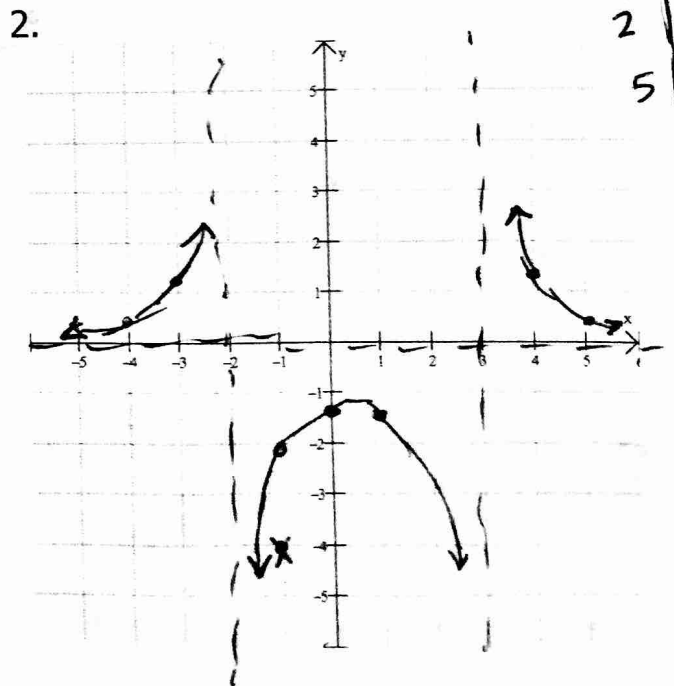
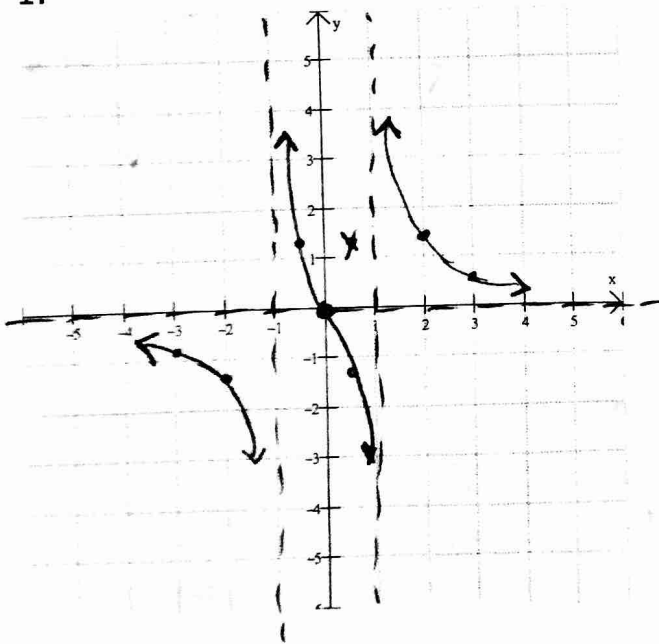
x	y
-5	4/3
1	

VA: x = -1/2 X-int: -2, -9
 HA: none y-int: 18

6. $g(x) = \frac{x-4}{x^2-3x} = \frac{x-4}{x(x-3)}$

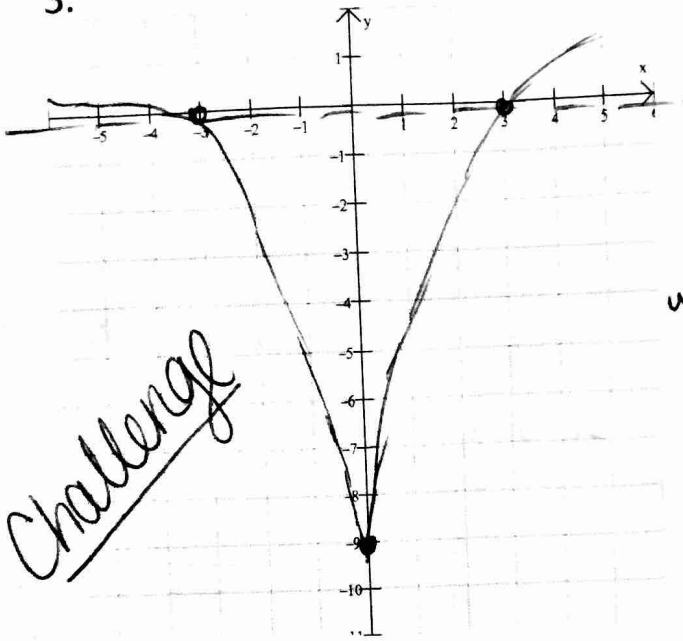
VA x = 0, x = 3
 HA y = 0 X-int: x = 4

x	y
-2	-6
-1	-5/4
1	3/2
2	1
5	-1



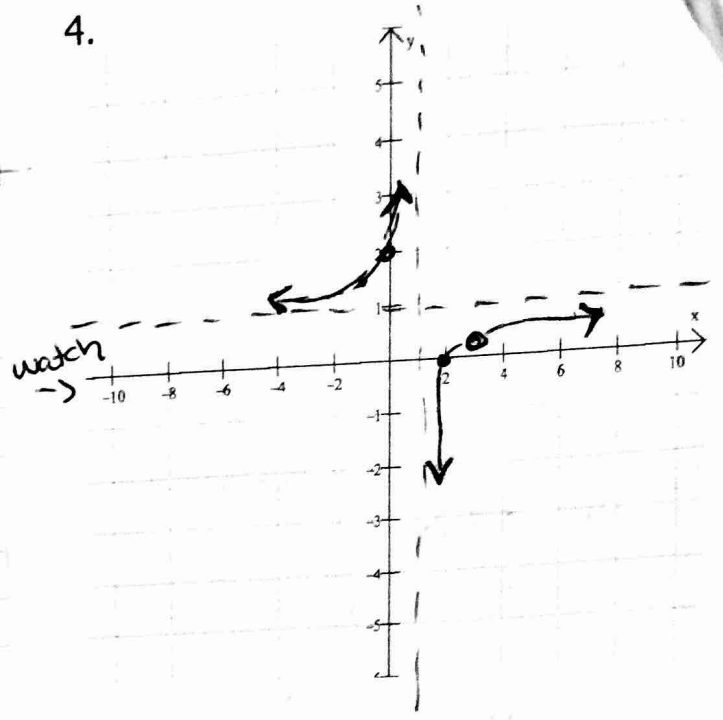
Sketching Graphs

3.

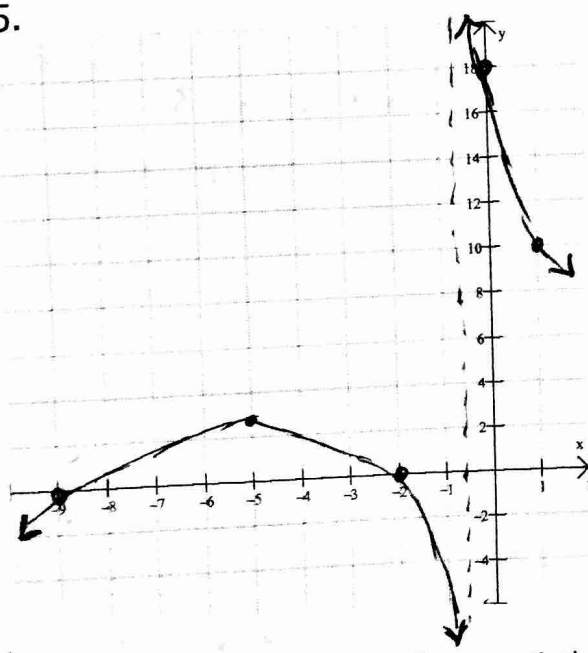


Challenge

4.



5.

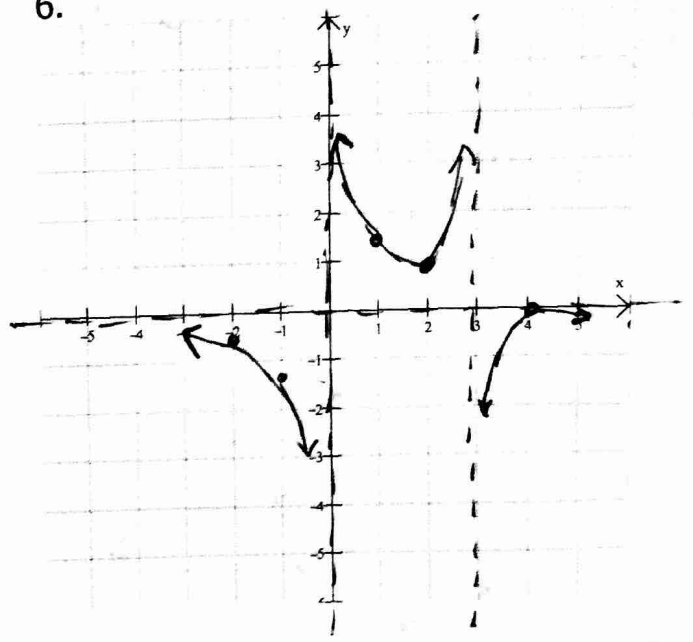


many answers

Write a rational function that has a vertical asymptote at $x = 1$, a point discontinuity at $x = -1$ and a horizontal asymptote at $y = 0$.

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

6.



8. Write a rational function that has a horizontal asymptote at $y = 3$, no vertical asymptotes and a point discontinuity at $x = 4$.

$$\frac{3(x-4)}{(x-4)}$$

9. Write a rational function that has no horizontal asymptote and a zero at $x = -2$.

$$\frac{(x+2)(x+4)}{x}$$