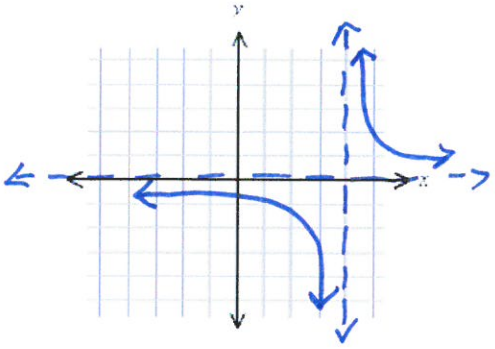
***AAT (IC/HW)-Days 1-2**
Chapter 4: 4-5 Rational Functions

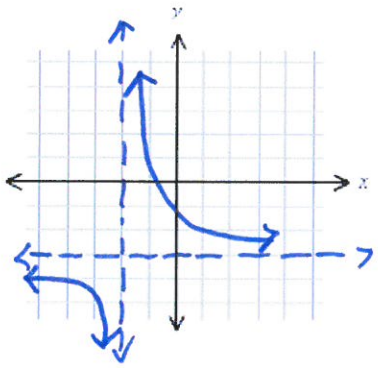
Name Key
Date: _____ Period: _____

Sketch the graph of f. Label the vertical and horizontal asymptotes.

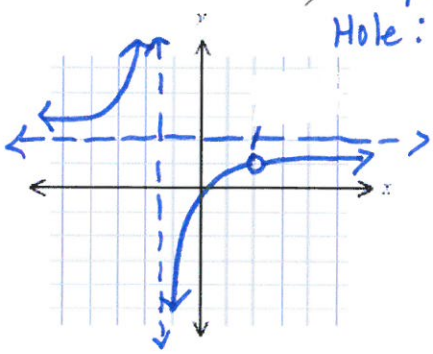
1. $f(x) = \frac{3}{x-4}$ VA: $x=4$ HA: $y=0$



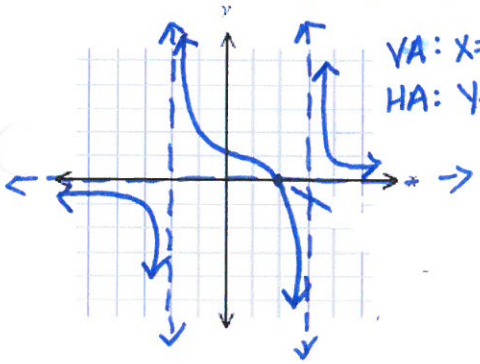
2. $f(x) = \frac{-3x}{x+2}$ VA: $x=-2$ HA: $y=-3$



3. $f(x) = \frac{(4x-1)(x-2)}{(2x+3)(x-2)}$ VA: $x=-\frac{3}{2}$ HA: $y=2$ Hole: $x=2$

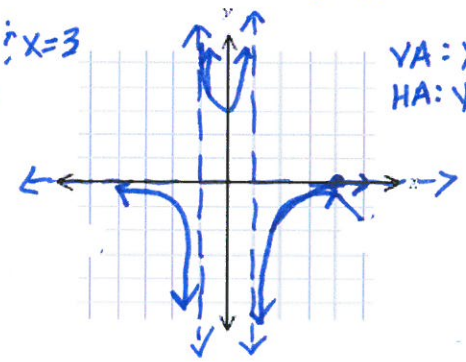


4. $f(x) = \frac{(x-2)}{(x^2-x-6)} = \frac{x-2}{(x+2)(x-3)}$



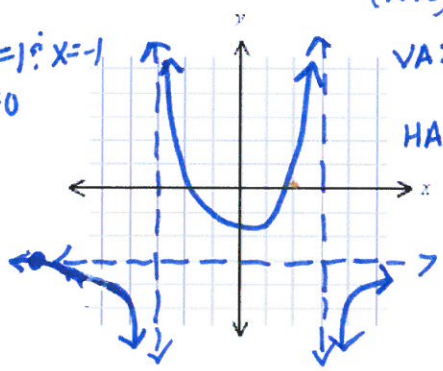
VA: $x=-2$; $x=3$
HA: $y=0$

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



VA: $x=1$; $x=-1$
HA: $y=0$

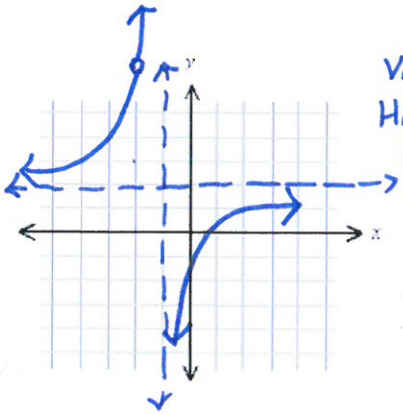
6. $f(x) = \frac{-3x^2-3x+6}{x^2-9} = \frac{-3(x+2)(x-1)}{(x+3)(x-3)}$



VA: $x=3$; $x=-3$
HA: $y=-3$

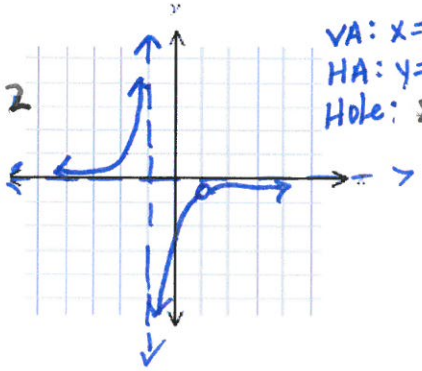
Simplify f(x), and sketch the graph of f.

7. $f(x) = \frac{2x^2+x-6}{x^2+3x+2} = \frac{(x+2)(2x-3)}{(x+2)(x+1)} = \frac{2x-3}{x+1}$; $x \neq -2$



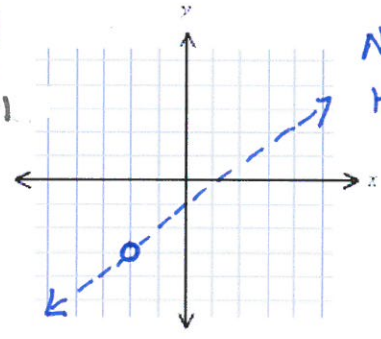
VA: $x=-1$
HA: $y=2$
Hole: $x=-2$

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



VA: $x=-1$
HA: $y=0$
Hole: $x=1$

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



No Asym;
Hole: $x=-2$

Find an equation of a rational function f that satisfies the given conditions.

10. vertical asymptote: x=4
horizontal asymptote: y = -1
x-intercept: 3

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

or

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

11. vertical asymptotes: x = -2, x = 0
horizontal asymptote: y = 0
x-intercept: 2; f(3) = 1

$f(x) = \frac{a(x-2)}{x(x+2)}$; $f(3)=1$, so

$f(3) = \frac{a(1)}{3(5)} = \frac{a}{15} = 1$; $a = 15$

$f(x) = \frac{15(x-2)}{x(x+2)} = \frac{15x-30}{x^2+2x}$

12. vertical asymptotes: x = -3, x = 1
horizontal asymptote: y = 0
x-intercept: -1; f(0)= -2
hole at x = 2

$f(x) = \frac{a(x+1)(x-2)}{(x-1)(x+3)(x-2)}$; $f(0) = \frac{a(1)}{(-1)(3)} = \frac{a}{-3} = -2$; $a = 6$

$f(x) = \frac{6(x+1)(x-2)}{(x-1)(x+3)(x-2)} = \frac{6x^2-6x-12}{x^3-7x+6}$

13. (a) A student has finished 48 credit hours with a GPA of 2.75. How many additional credit hours y at 4.0 will raise the student's GPA to some desired value x? (Determine y as a function of x.)

$\frac{48(2.75)+y(4.0)}{48+y} = x$; $132+4y = 48x+xy$

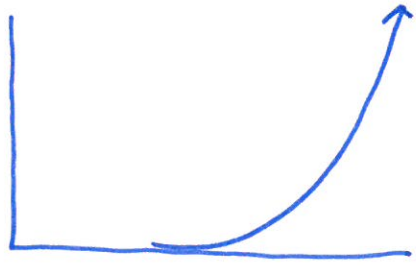
$132-48x = xy-4y$

$132-48x = y(x-4)$ → $y = \frac{132-48x}{x-4}$

(b) Create a table of values for x and y, starting with x=2.8 and using increments of 0.2.

x	y
2.8	2
3	12
⋮	⋮
4	error

(c) Graph the function in part (a) in the viewing rectangle [2,4] by [0,1000,100].



(d) What is the vertical asymptote of the graph in part (c)?

$x = 4$

(e) Explain the practical significance of the value x = 4.

cumulative GPA of 4.0 is not attainable