

Thursday, Feb. 15th

# NO SCHOOL ON MONDAY, FEB. 19TH FOR FAMILY DAY

## Plan For Today:

1. Review some questions from 4.3

✳ Do Check-in Quiz

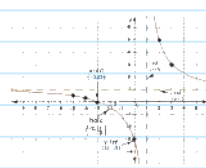
2. Finish Chapter 4: Rational Functions

✳ 4.3: Rational Functions

✳ **4.4: Graphing Rational Functions**

3. Work on Practice Questions from Workbook

Graph of Rational Function  $f(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$



## Plan Going Forward:

1. Finish going through all of the 4.3-4.4 questions in workbook and finish working on practice review handout and project.

🔴 **CHAPTER 4 PROJECT DUE TUESDAY, FEB. 20TH**

🔴 **CHAPTER 4 TEST ON TUESDAY, FEB. 20TH**

2. We will review as needed after the Ch4 test on Tuesday. Work on Ch3 and 4 review from workbook.

## ✳ **UNIT 2 EXAM ON CH3&4 ON THURSDAY, FEB. 22ND**

- 10 Multiple Choice & 20 marks on the Written
- ~1 hour - please prepare so you are not "learning" while doing the test
- Closed-book - no notes
- Rewrite is following Tuesday after class at 12:30pm
- I will email you this weekend when marks are posted so you can decide on the rewrite
- I will go over the marked exam on Tuesday

3. We will start Ch5 Exponents and Logs on Tuesday and continue Thursday next week after the U2 exam.

Please let me know if you have any questions or concerns about your progress in this course. The notes from today will be posted at [anurita.weebly.com](http://anurita.weebly.com) after class.  
Anurita Dhiman = [adhiman@sd35.bc.ca](mailto:adhiman@sd35.bc.ca)

$$3x \cdot \left( \frac{5}{x} - \frac{1}{3} \right) = 3x \cdot \left( \frac{1}{x} \right)$$

Multiply both sides by the LCD.

$$3x \cdot \frac{5}{x} - 3x \cdot \frac{1}{3} = 3x \cdot \frac{1}{x}$$

Distribute.

$$15 - x = 3$$

Simplify, and then solve.

$$-x = -12$$

$$x = 12$$

# Thursday, Feb. 15th In-Class Notes

Name: \_\_\_\_\_

TOTAL = \_\_\_\_\_ / 6 marks

### Check-in Quiz Section 4.3: Graphing Characteristics of Rational Functions

Complete the following questions SHOWING ALL WORK and steps where applicable.

1. Graph the following function and fill in the information in the table. Show all work.

4 marks

$$y = \frac{3x^2 + 6x - 9}{x^2 - 9}$$

Show work here:

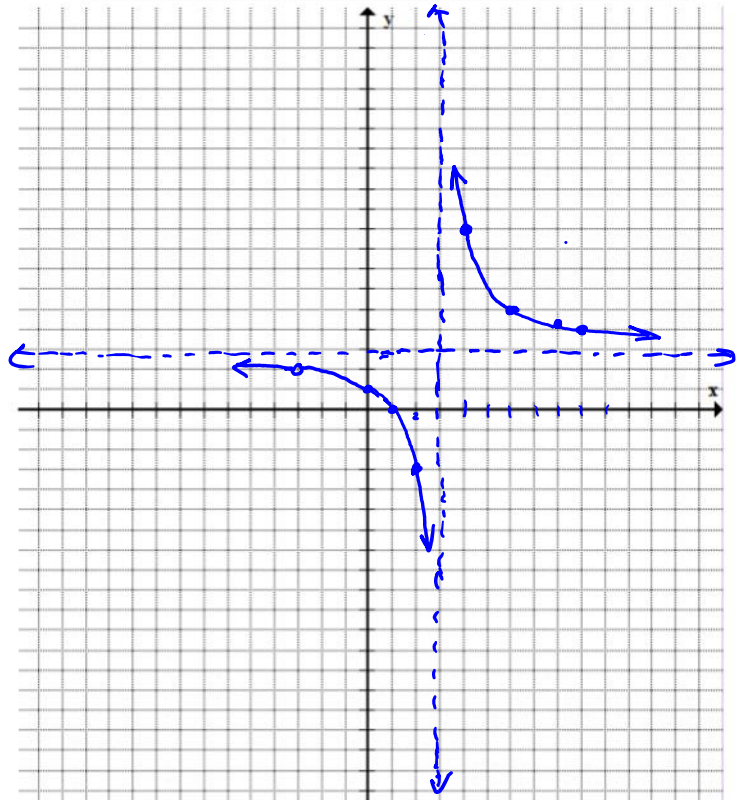
$$y = \frac{3(x^2 + 2x - 3)}{x^2 - 9}$$

$\begin{matrix} -3 \\ +3, -1 = 2 \end{matrix}$

$$y = \frac{3(x+3)(x-1)}{(x+3)(x-3)}$$

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

Characteristic	Answer
Restrictions	$x \neq -3, x \neq 3$
Asymptote(s)	VA $\Rightarrow x = 3$ HA $\Rightarrow y = 3$
Point(s) of Discontinuity	$(-3, 2)$ $y = 3 \frac{(-3-1)}{-3-3} \rightarrow \frac{-12}{-6}$
x-intercept	$0 = x - 1 \rightarrow x = 1 \quad (1, 0)$
y-intercept	$y = 3 \frac{(0-1)}{0-3} \rightarrow \frac{-3}{-3} \quad (0, 1)$
Domain	$\{x \mid x \neq -3, x \neq 3, x \in \mathbb{R}\}$
Range	$\{y \mid y \neq 2, y \neq 3, y \in \mathbb{R}\}$



$$\frac{3(2-1)}{2-3}$$

$$\frac{3}{-1} = -3$$

x	y
2	-3
4	9
6	5
8	$\frac{21}{5}$
⋮	⋮

9

4.2

2. Determine the **equation** of the following function given the information provided:

2 marks

**x-intercepts at  $(2,0)$  and  $(-2,0)$ , POD at  $(1,-3)$ .**

*Show equation in factored form (bracket form) and in expanded form.*

p.191

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

x					
f(x)					

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

HOLE  $x \neq 0$   
(POD)  $(0, 0)$

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

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

### Solving Rational Equations (4.4)

p.187 Ex:5.

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



$0 = \frac{x^2 - 9}{x^2 - x - 2}$

Solve algebraically (not graphing)



make  $y = 0$  → give x-intercepts

Recall: x-intercepts

= solutions

= zeros

= roots

$0 = x^2 - 9$

$0 = (x+3)(x-3)$

$x = -3$     $x = 3$

$\sqrt{9} = \sqrt{x^2}$

$x = \pm 3$

$x = 3, x = -3.$

★ always check restrictions

→  $x^2 - x - 2 \neq 0$

\* always check restrictions from denominator  $\rightarrow x^2 - x - 2 \neq 0$   
 $(x-2)(x+1) \neq 0$   
 $\downarrow \quad \downarrow$   
 $x \neq 2 \quad x \neq -1$

final solutions  $x = -3, x = 3$

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

$$0 = \frac{1}{x+1} \frac{(x-1)}{(x-1)} - \frac{1}{x-1} \frac{(x+1)}{(x+1)} + 2 \frac{(x+1)(x-1)}{(x+1)(x-1)}$$

common denominator.  
 $(x+1)(x-1)$

$$0 = \frac{x-1}{(x+1)(x-1)} - \frac{(x+1)}{(x+1)(x-1)} + \frac{2(x^2-1)}{(x+1)(x-1)}$$

$$0 = \frac{\cancel{x}-1 - \cancel{x}-1 + 2x^2 - 2}{(x+1)(x-1)}$$

$$x - x = 0$$

$$-1 - 1 - 2 = -4$$

$$0 = \frac{2x^2 - 4}{(x+1)(x-1)}$$

$$0 = 2x^2 - 4$$

$$\frac{4}{2} = \frac{2x^2}{2}$$

$$\sqrt{2} = \sqrt{x^2}$$

$$x = \pm \sqrt{2}$$

Restrictions.

$$x+1 \neq 0 \quad x-1 \neq 0$$

$$x \neq -1 \quad x \neq 1$$

p.189 # 4 (all)

Clue 7	$\frac{x-4}{6x} + \frac{x^2-3x-10}{6x} = \frac{x-1}{6}$
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$$\frac{x-4}{6x} + \frac{x^2-3x-10}{6x} - \frac{x-1}{6x} = 0$$

LCD  
6x

$$\frac{x-4}{6x} + \frac{x^2-3x-10}{6x} - \frac{x^2-x}{6x} = 0$$

$$\frac{x-4+x^2-3x-10-x^2+x}{6x} = 0$$

Clue 8

$$\frac{1}{x^2} = \frac{x-1}{x} + \frac{1}{x}$$

LCD

$x^2$

$$0 = \frac{x-1}{x} + \frac{1}{x} - \frac{1}{x^2}$$

$$0 = \frac{x^2-x+x-1}{x^2}$$

$$0 = \frac{x^2-1}{x^2}$$

## Ch4 Review Practice Question



## Chapter 4 Practice Review questions

### Rational Function Graphs, Solving Rational Equations and Applications

1. Describe the transformations and graph the base function AND the transformed function below – include mapping notation and the completed table of values.

a.  $y = \frac{2}{x-5} + 2$

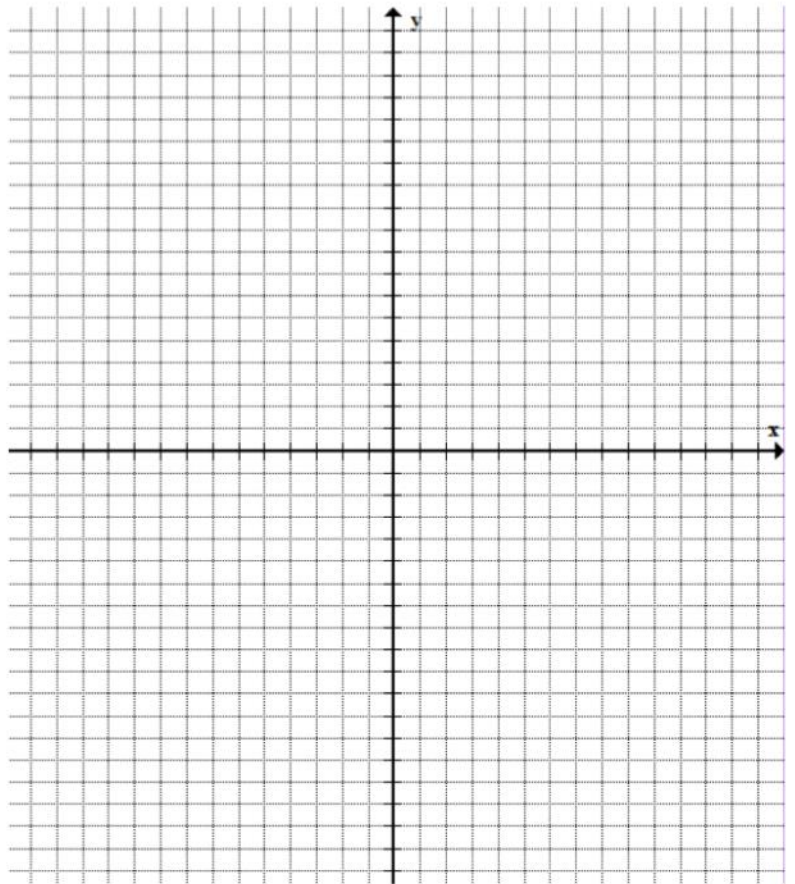
Describe the transformations:

$$y = \frac{1}{x}$$

x	y







State the domain and range:

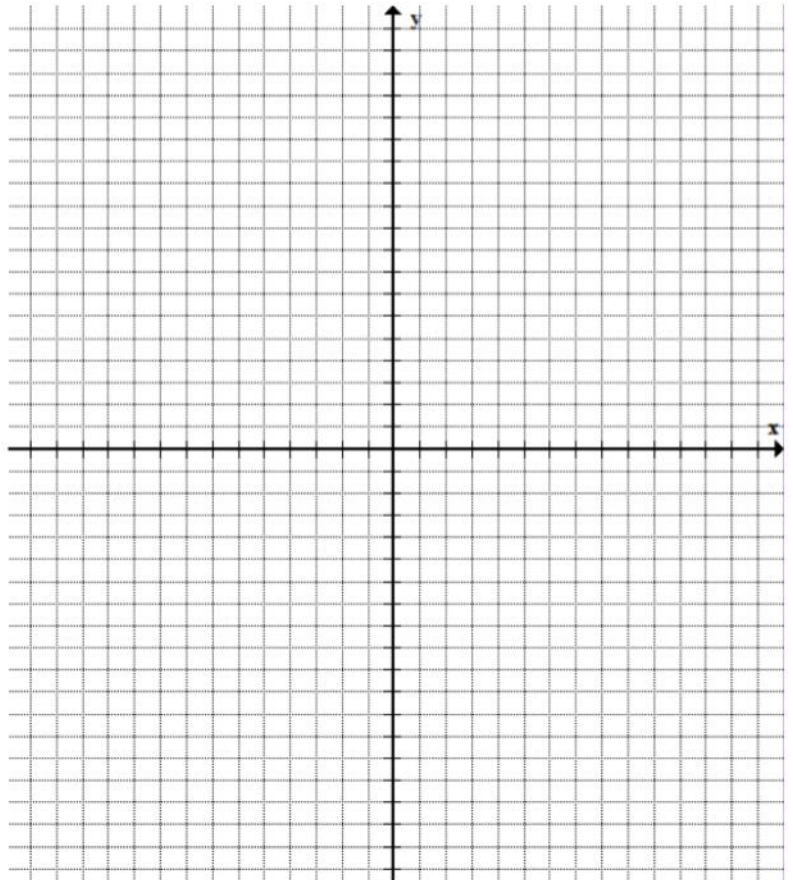
State the equation of the asymptote:

b.  $y = \frac{1}{\frac{1}{2}(x+3)} - 4$

Describe the transformations:

$$y = \frac{1}{x}$$

$x$	$y$









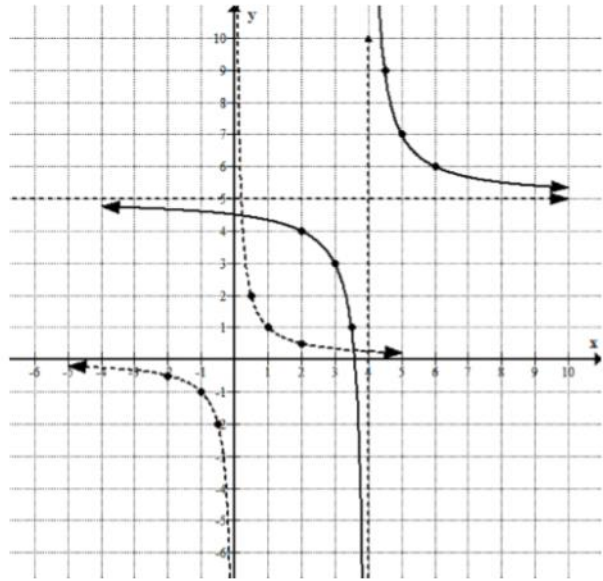


State the domain and range:

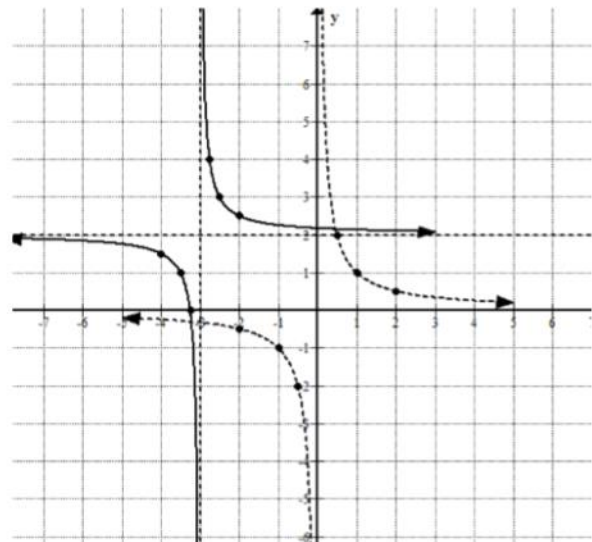
State the equation of the asymptote:

2. Write an equation for each of the transformed graphs below. The base function is given.

a.



b.



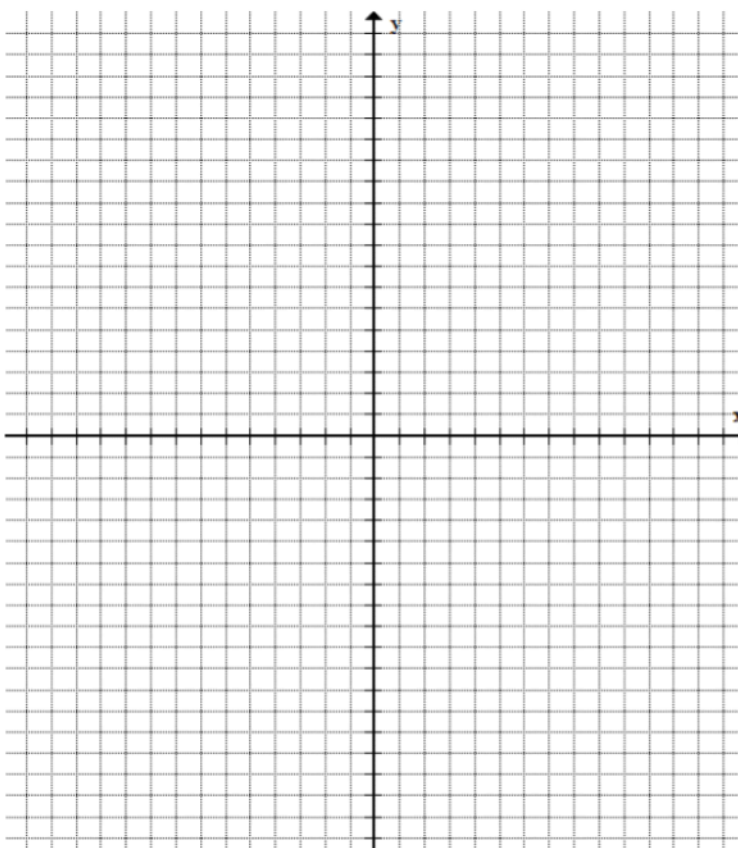
3. Write the equation of each function with the given transformations:

a.  $f(x) = \frac{1}{x}$  is stretched vertically by a factor of 2, stretched horizontal by a factor of 2, reflected in the y-axis, and translated 6 right and 3 down.

b.  $y = \frac{1}{x}$  is stretched horizontally by a factor of  $\frac{1}{2}$ , reflected in the x-axis, and translated 3 left and 1 down.

4. For each of the following functions, simplify (if possible), determine all of the characteristics of each and graph each function.

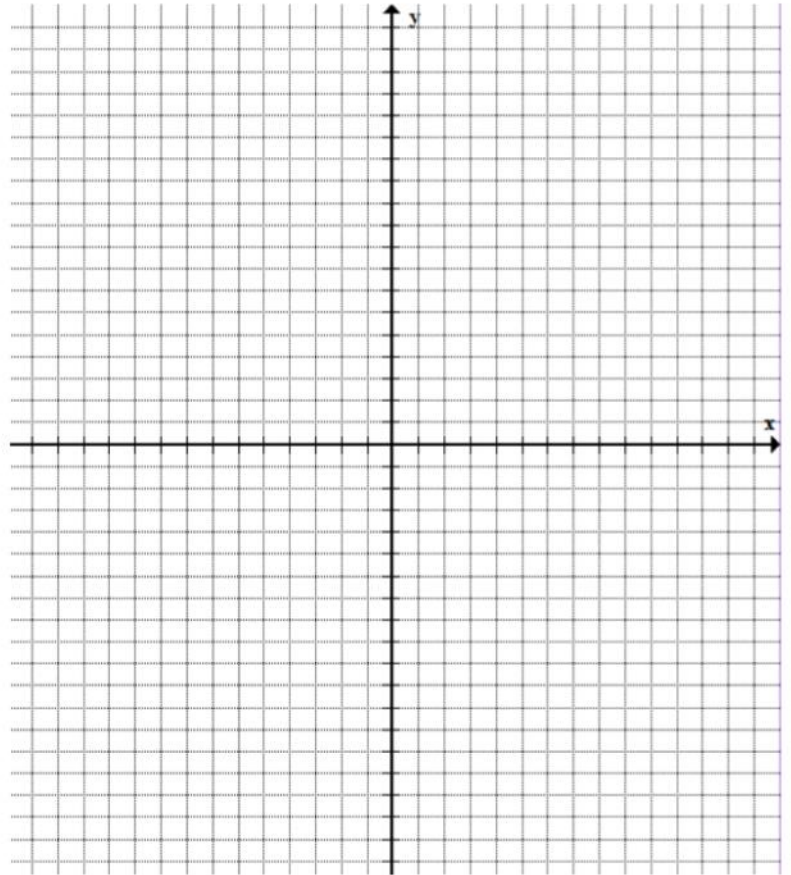
a.  $y = \frac{2x-6}{x^2-5x+4}$



Characteristic	Answer
Restrictions	
Asymptote(s)	
Point(s) of Discontinuity	
x-intercept	
y-intercept	
Domain	
Range	

Show work here:

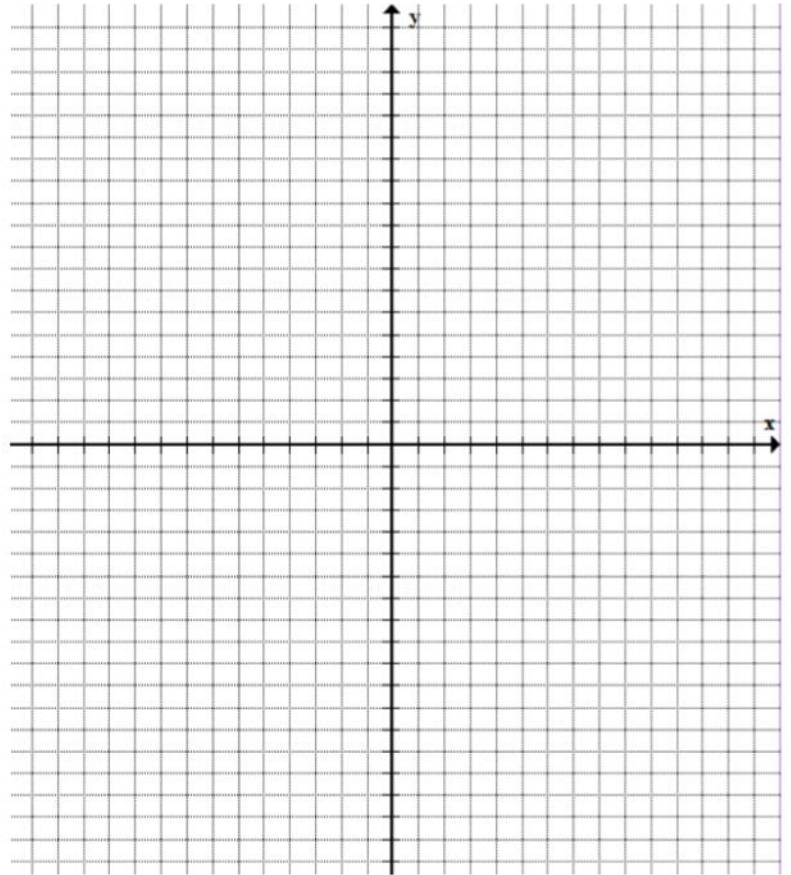
b.  $y = \frac{3x^2 - 18x + 24}{x^2 - 2x - 8}$



Characteristic	Answer
Restrictions	
Asymptote(s)	
Point(s) of Discontinuity	
x-intercept	
y-intercept	
Domain	
Range	

Show work here:

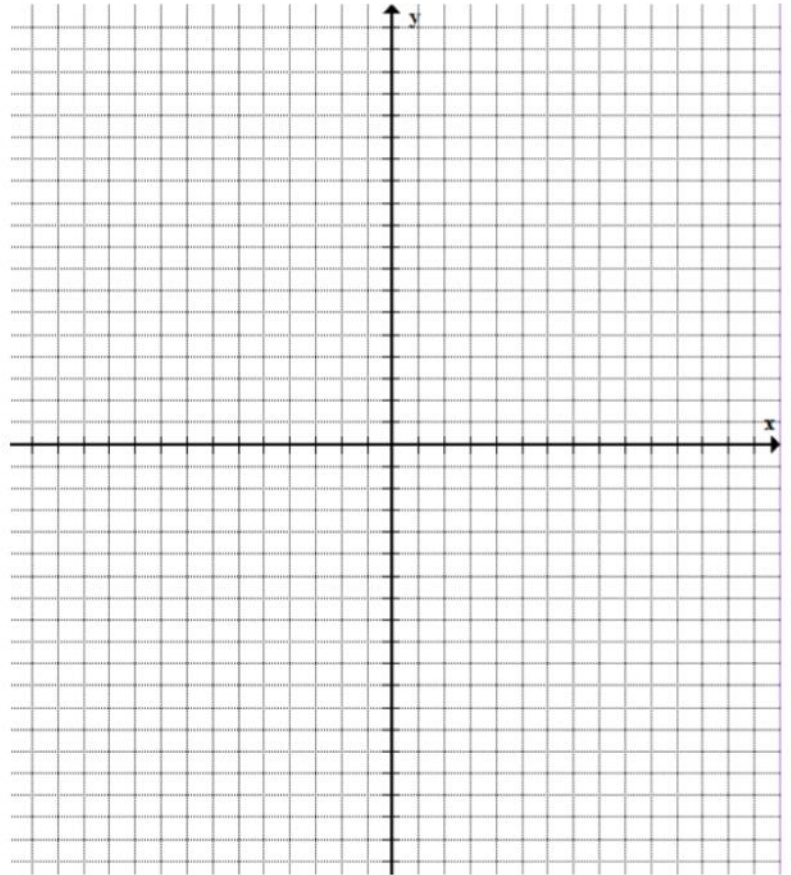
c.  $y = \frac{2x^2 - 3x - 5}{2x - 5}$



Characteristic	Answer
Restrictions	
Asymptote(s)	
Point(s) of Discontinuity	
x-intercept	
y-intercept	
Domain	
Range	

Show work here:

d.  $y = \frac{2x^2 + 7x - 4}{x^2 + x - 12}$



Characteristic	Answer
Restrictions	
Asymptote(s)	
Point(s) of Discontinuity	
x-intercept	
y-intercept	
Domain	
Range	

Show work here:

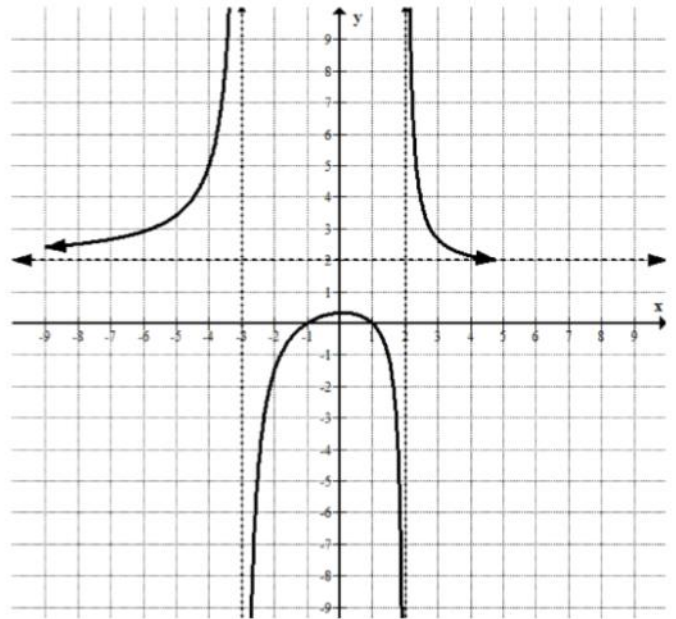


5. Given the following information, determine a possible equation for the rational function:  
Show the final polynomial form of the rational function.
- Vertical asymptotes at  $x = -4$  and  $x = 2$ , an x-intercept at  $x = 5$  and  $x = -2$

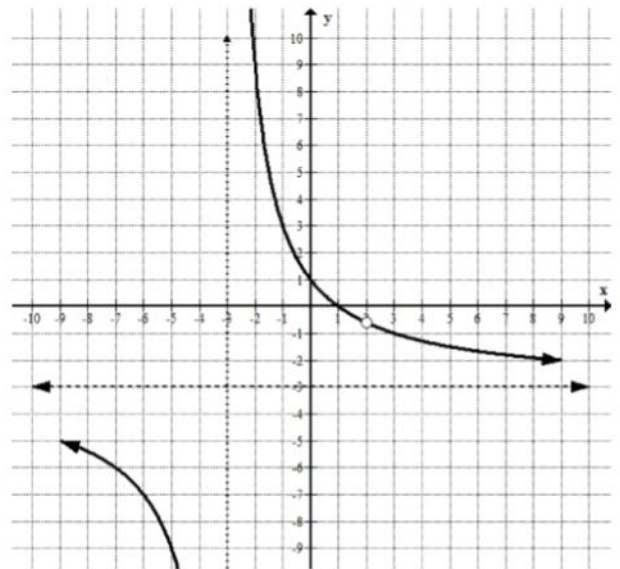
- A vertical asymptote at  $x = -3$ , x-intercept at  $x = 2$ , a horizontal asymptote at  $y = -4$ , and a point of discontinuity at  $x = 1$

6. Given the graph of the rational function below, determine a possible equation of the function:  
 Show the final polynomial form of the rational function.

a.



b.



~~OMIT~~  
or edit.

7. Solve the following algebraically and show all restrictions:

a.  ~~$\frac{3x+2}{x+1} = \frac{5x+4}{x+1}$~~   
 $\frac{5x+4}{x+1}$

b.  $\frac{3x}{4x+1} - 1 = \frac{x}{2x-1}$

$\frac{3x}{4x+1} - 1 - \frac{x}{2x-1} = 0$

c.  $\frac{1}{x^2-9} + \frac{1}{x+3} = 0$

factor  $\rightarrow$   $\frac{1}{(x+3)(x-3)} + \frac{1}{x+3} = 0$

d.  ~~$\frac{2x}{x-1} + \frac{x}{x^2-4x+3} = \frac{x+1}{x-3} - 2$~~

$0 =$

SKIP

- 12.** Ann cycles 6 km to return a friend's bicycle. She then walks home. Her total time for the trip is 90 min. Ann cycles four times as fast as she walks. Determine Ann's average speeds for walking and for cycling.

Ann's average walking speed is 5 km/h and her average cycling speed is 4(5 km/h), or 20 km/h.

- 13.** Henry's average running speed is 1 km/h greater than Brandon's. In a 10-km practice race for Footstock in Alberta, Brandon finished 2 min behind Henry. Determine the average running speed of each person.

Brandon's average running speed is approximately 16.8 km/h and Henry's average running speed is approximately  $(16.8 + 1)$  km/h, or 17.8 km/h.