Day 4

I. Warm-up/homework Questions
II. Review polynomial equations and graphs.
III. Graph Rational functions (in factored form)
IV. Assignment Pg 145 9-15 all, 29, 47

2.5 Day 1
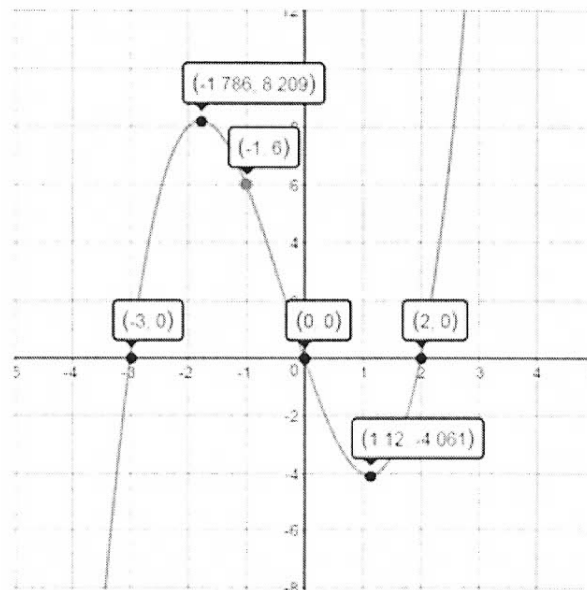Guided No...

Warm-up: Identify each of the following for this graph.

1. Parent equation x^3
2. End behavior using limits
3. Zeros $x = -3, 0, 2$
4. Y-intercept $(0,0)$
5. Extrema
6. Possible Equation

2) $\lim\limits_{x \to -\infty} f(x) = -\infty$; $\lim\limits_{x \to \infty} f(x) = \infty$

5) rel max: $(-1.786, 8.209)$,
   rel min: $(1.12, -4.061)$
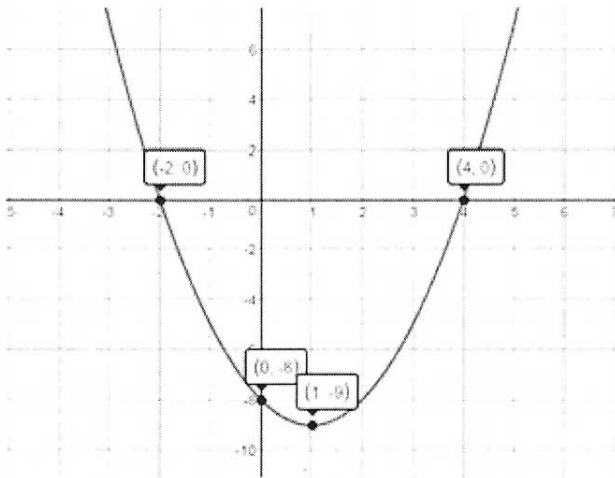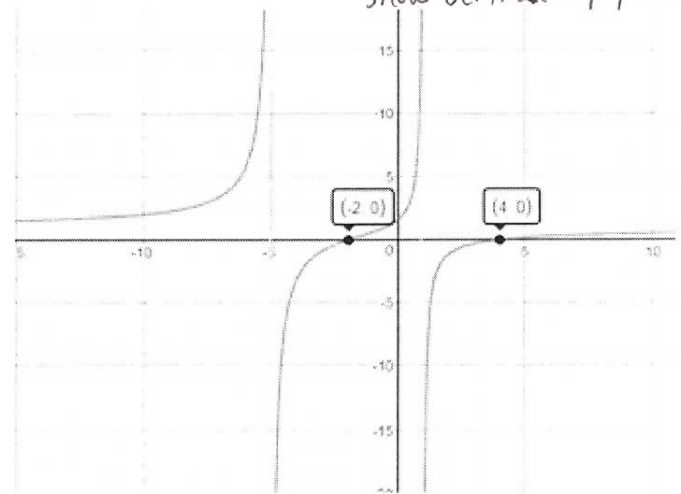
Homework Questions
Pg 104 (23-41 odd, 64-67, 81-84)

6. $y = a(x+3)(x-0)(x-2)$
   $y = ax(x+3)(x-2)$
   $6 = a(-1)(-1+3)(-1-2)$
   $6 = a(-1)(2)(-3)$
   $6 = 6a$
   $1 = a$
   $y = x(x+3)(x-2)$

Look closely at the equations for each graph below. In your groups, determine how each factor affects each graph.
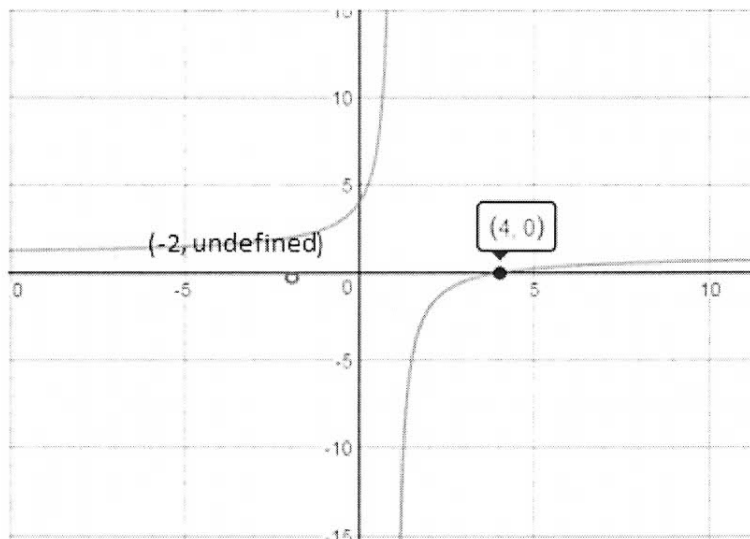
opposites show zeroes

$$y = (x - 4)(x + 2)$$

opposites of numerater
shows zeroes

$$y = \frac{(x - 4)(x + 2)}{(x - 1)(x + 5)}$$ opposites of denominator
show vertical asymptotes

(-2, 0)　(4, 0)

(0, -8)　(1, -9)

(-2, 0)　(4, 0)

Let's look at one more.

zero ← ↘ hole

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

↑ vert. asymptote

(-2, undefined)　(4, 0)

Rational Functions Diagram
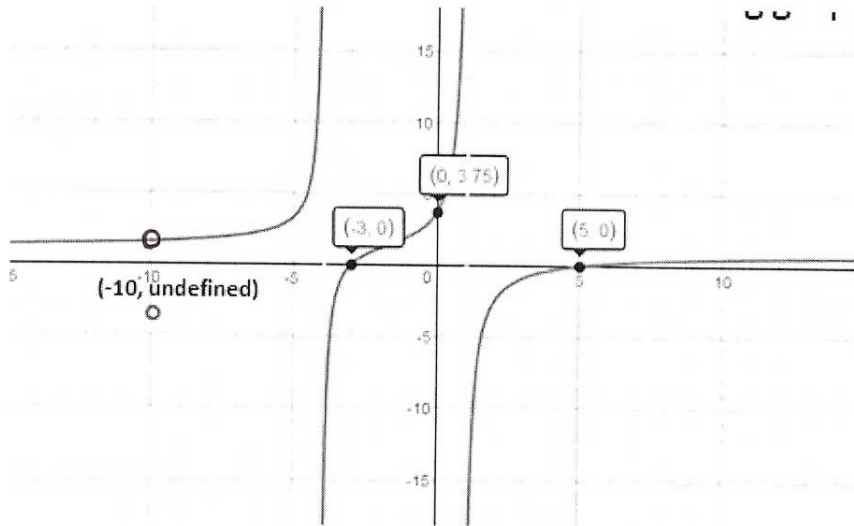
$$y = \frac{(zero)(zero)\,(hole)}{(Vert.Asymptote)(hole)}$$

Write a rational function with the following properties:
- Zero at (-3,0),
- vertical asymptote at $x = 2$
- hole at $x = 5$.

$$\frac{x(x+3)(x-5)}{(x-2)(x-5)}$$

Write a rational function for the following graph.

Zeroes: $x = -3, 5$

v. asymptotes: $x = -4, 1$

hole: $x = -10$

$$\frac{(x+3)(x-5)(x+10)}{(x+4)(x-1)(x+10)}$$

Graph labels: (0, 3.75), (-3, 0), (5, 0), (-10, undefined)

Can you draw the graph for
$$y = \frac{(x-4)(x+7)}{(x+2)(x-2)}$$

Zeroes: $x = 4, -7$

v. asymptotes: $x = -2, 2$

x	y
-8	0.2
0	+7
5	4/7
1	6
-1	10

$\frac{(-12)(-1)}{(-6)(-10)} = \frac{12}{60} = 0.2$
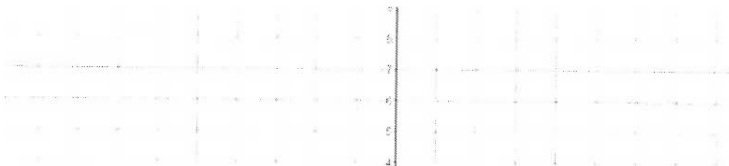
$\frac{(-4)(7)}{(2)(-2)} = \frac{-28}{-4} = +7$

$\frac{(1)(12)}{(7)(3)} = \frac{12}{21} = \frac{4}{7}$

$\frac{(-3)(8)}{(3)(-1)} = \frac{-24}{-3} = 8$

$\frac{(-5)(0)}{(1)(-3)} = \frac{-30}{-3} = 10$
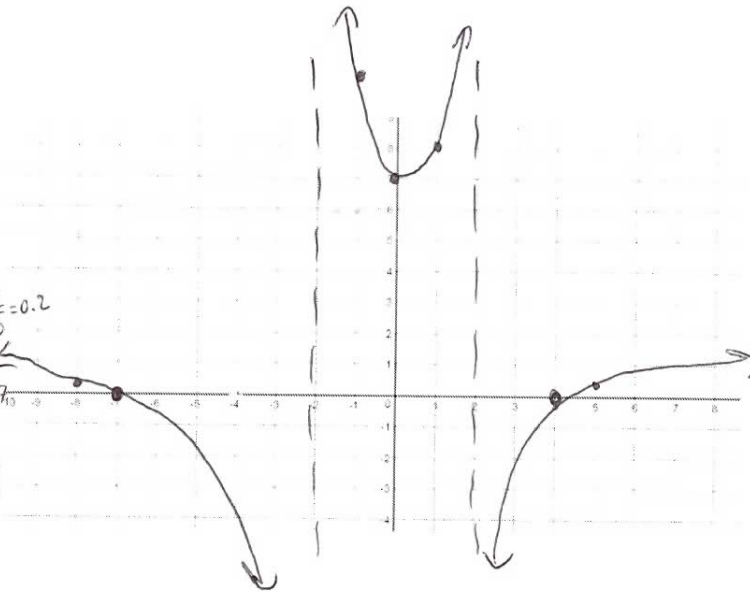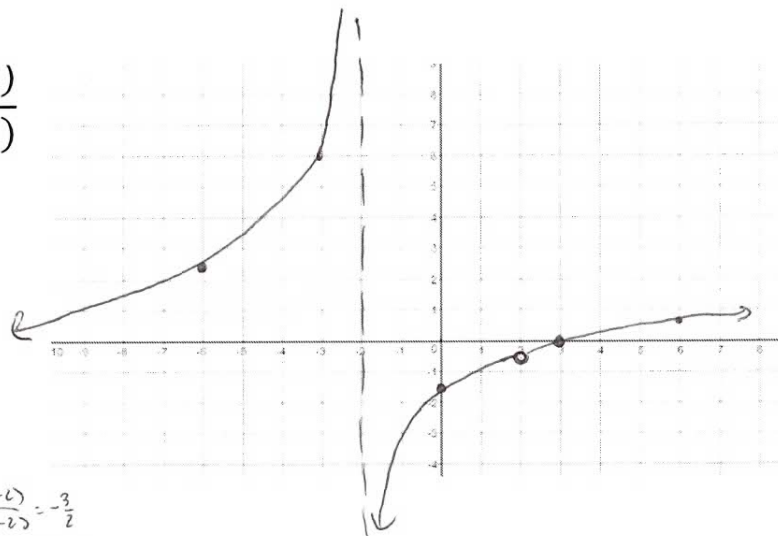
Try this one!
$$y = \frac{(x-3)(x-2)}{(x+2)(x-2)}$$

$$y = \frac{(x-3)(x-2)}{(x+2)(x-2)}$$
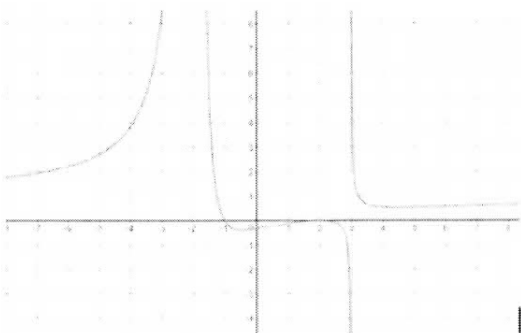
zeroes: $x = 3$

holes: $x = 2$

v. asymptotes: $x = -2$

$\frac{(-9)(-8)}{(-4)(-8)} = \frac{9}{4}$

$\frac{(-6)(-5)}{(-1)(-5)} = 6$

X	Y
-6	$9/4$
-3	6
0	$-3/2$
2	$-4/4$
6	$3/8$

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

$\frac{(-1)(0)}{(4)(0)}$

$\frac{(3)(4)}{(8)(4)} = 3/8$

Note: When factors are squared it changes how the graphs behave at each point.

$$y = \frac{(zero)(double\ zero)^2}{(even\ asymptote)^2(odd\ asymptote)}$$

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

Assignment: Pg 145 (9-15 all, 29, 47)