4.2 and 4.3 homework due today

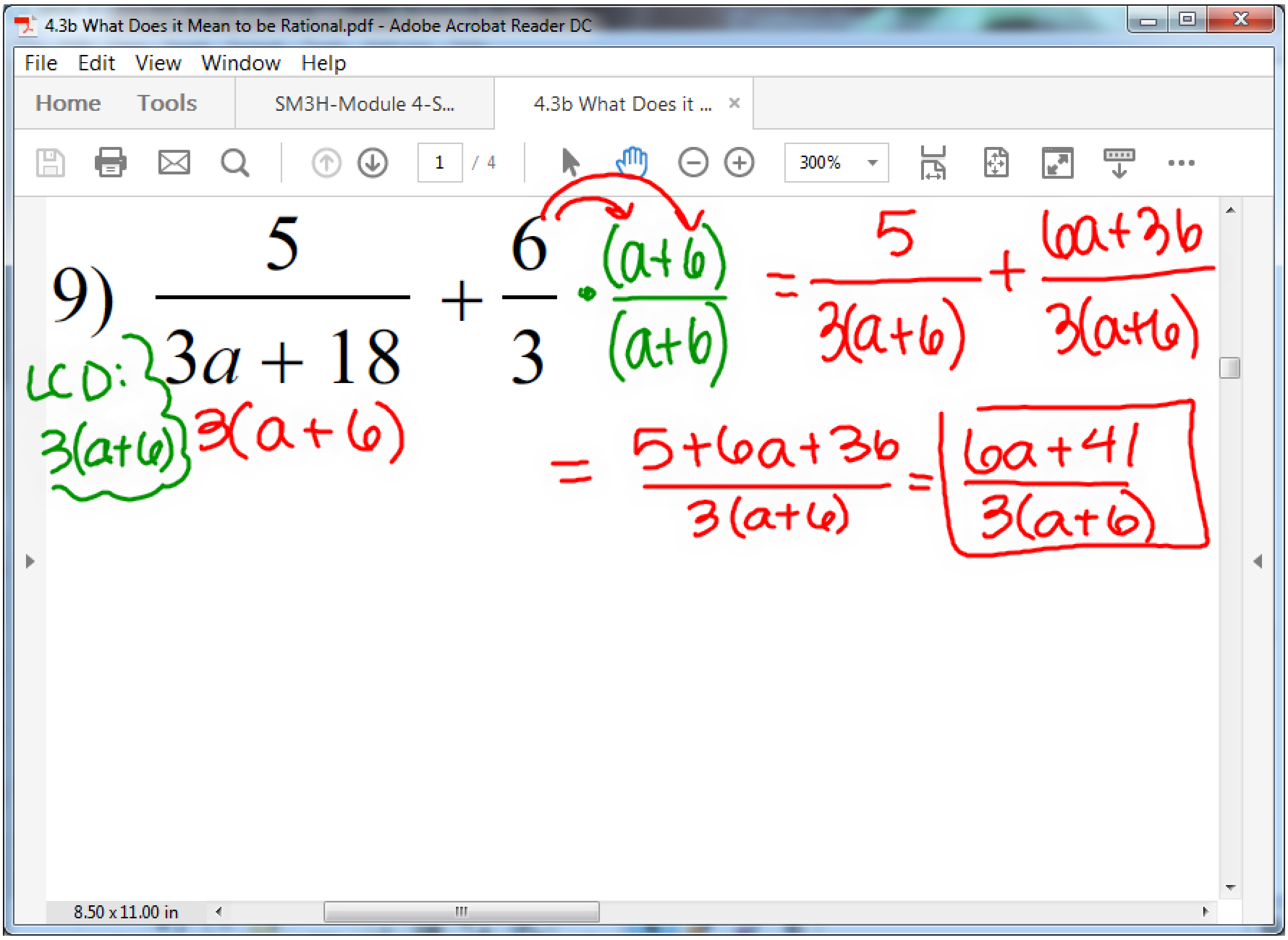
4.3b Worksheet due Thursday, 12/15

4.4 HW due Thursday 12/15

4.5 HW (7-12) & (21-26) due Monday 12/19

4.6 HW (finish pgs.30-31 and skip pgs.32-34) due Monday 12/19

Dec 13-8:07 AM

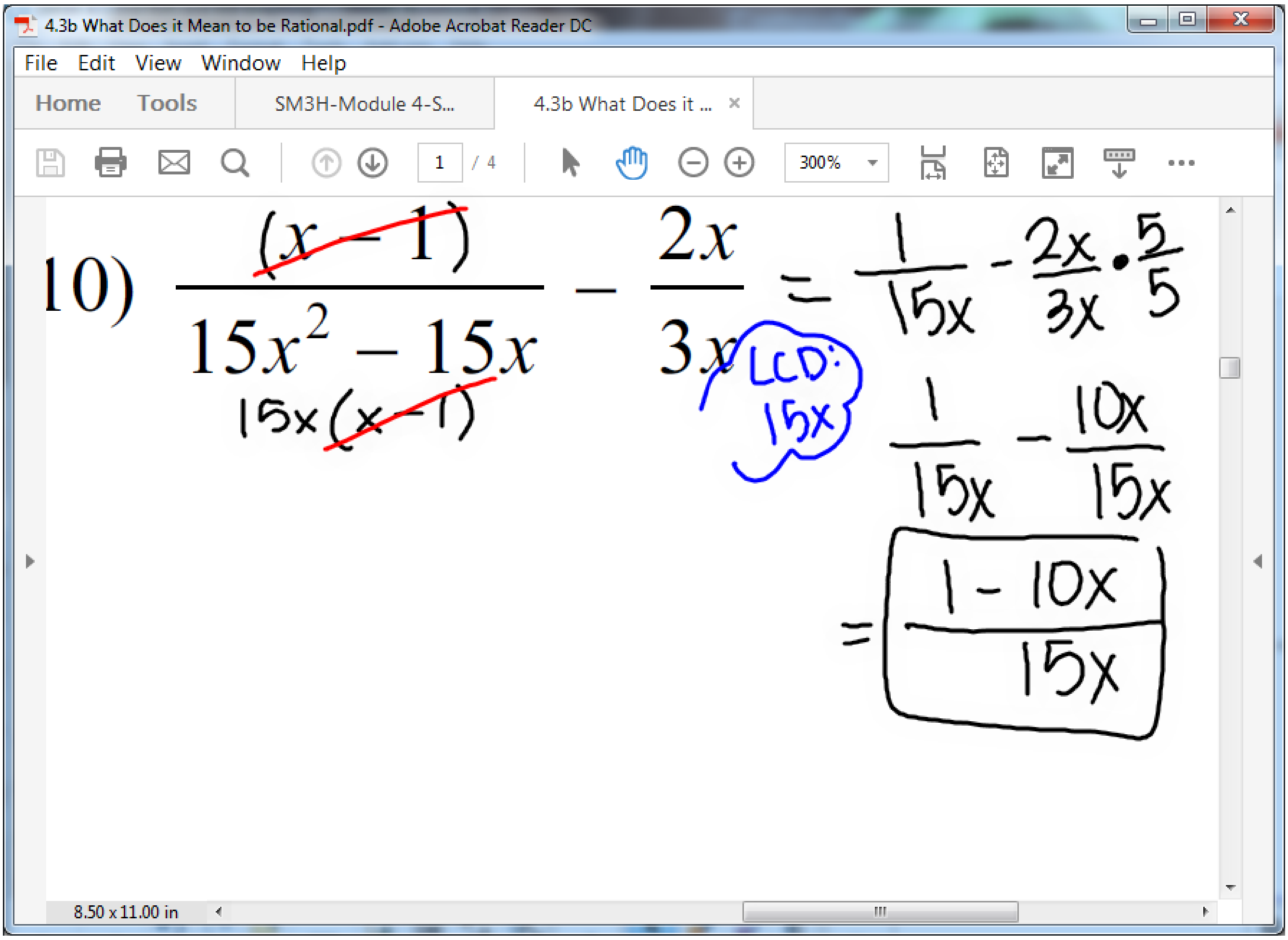


9) $$\frac{5}{3a+18} + \frac{6}{3} \cdot \frac{(a+6)}{(a+6)} = \frac{5}{3(a+6)} + \frac{6a+36}{3(a+6)}$$

LCD: $3(a+6)$

$3(a+6)$

$$= \frac{5+6a+36}{3(a+6)} = \boxed{\frac{6a+41}{3(a+6)}}$$



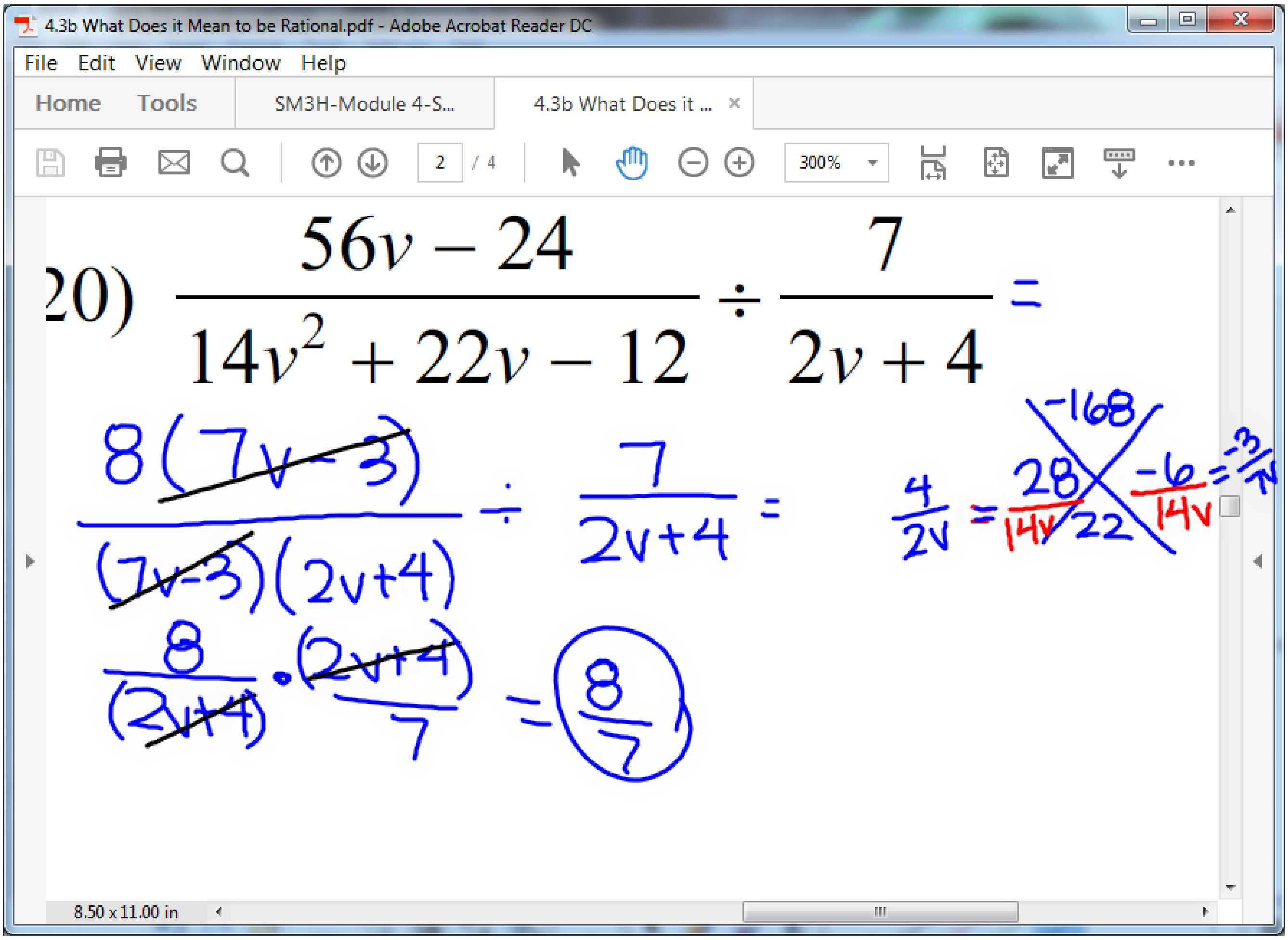
10) $$\frac{\cancel{(x-1)}}{15x^2-15x} - \frac{2x}{3x} = \frac{1}{15x} - \frac{2x}{3x}\cdot\frac{5}{5}$$

$$15x\cancel{(x-1)}$$

LCD: 15x

$$\frac{1}{15x} - \frac{10x}{15x}$$

$$= \boxed{\frac{1-10x}{15x}}$$



20) $\frac{56v-24}{14v^2+22v-12} \div \frac{7}{2v+4} =$

$\frac{8\cancel{(7v-3)}}{\cancel{(7v-3)}(2v+4)} \div \frac{7}{2v+4} =$

$\frac{4}{2v} = \frac{28}{14v}$

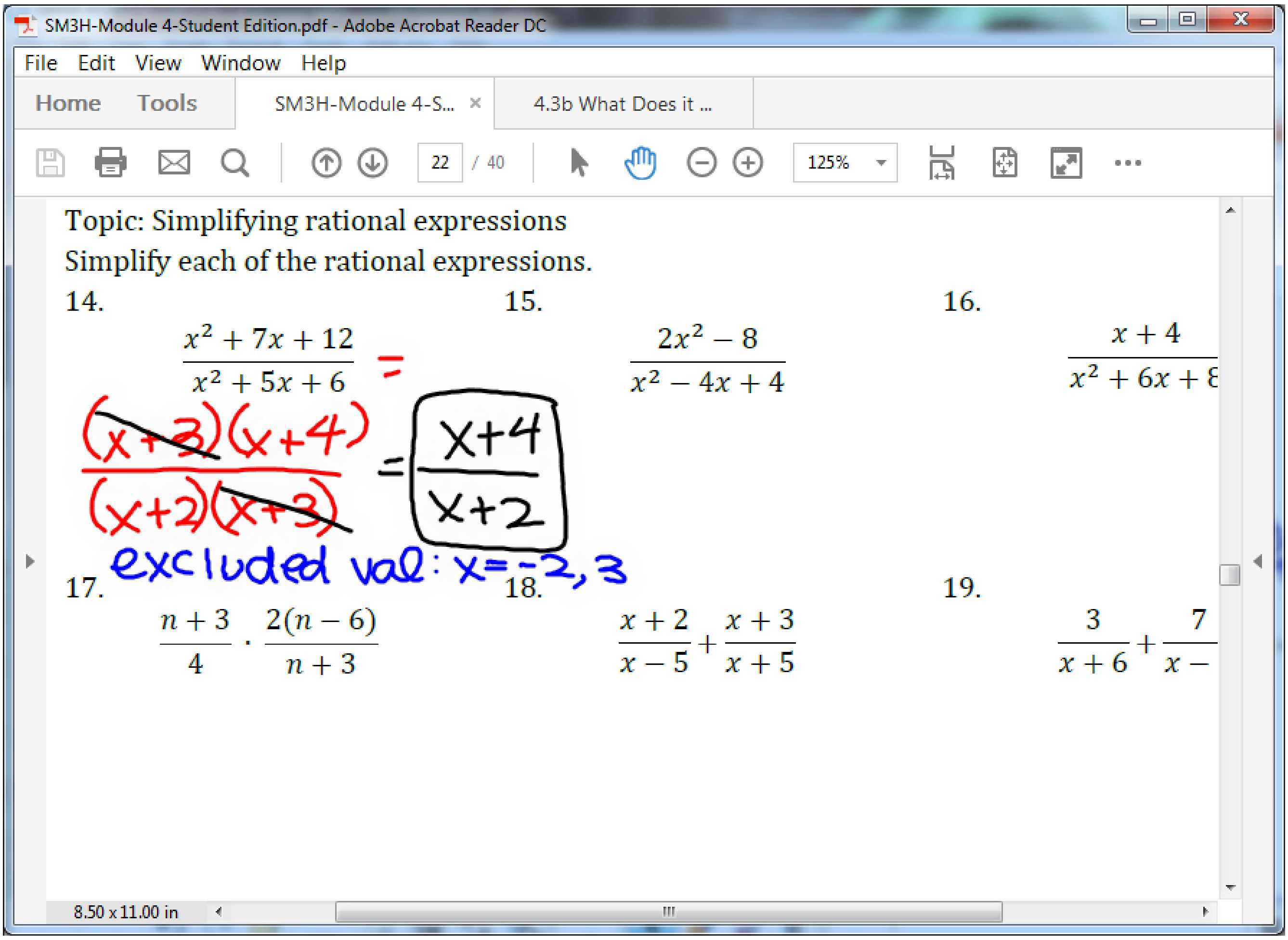
-168

$28 \quad -6$

22

$\frac{-6}{14v} = \frac{-3}{7v}$

$\frac{8}{\cancel{(2v+4)}} \cdot \frac{\cancel{(2v+4)}}{7} = \boxed{\frac{8}{7}}$



Topic: Simplifying rational expressions

Simplify each of the rational expressions.

14. $\frac{x^2+7x+12}{x^2+5x+6} = \frac{\cancel{(x+3)}(x+4)}{(x+2)\cancel{(x+3)}} = \boxed{\frac{x+4}{x+2}}$

excluded val: $x=-2,3$

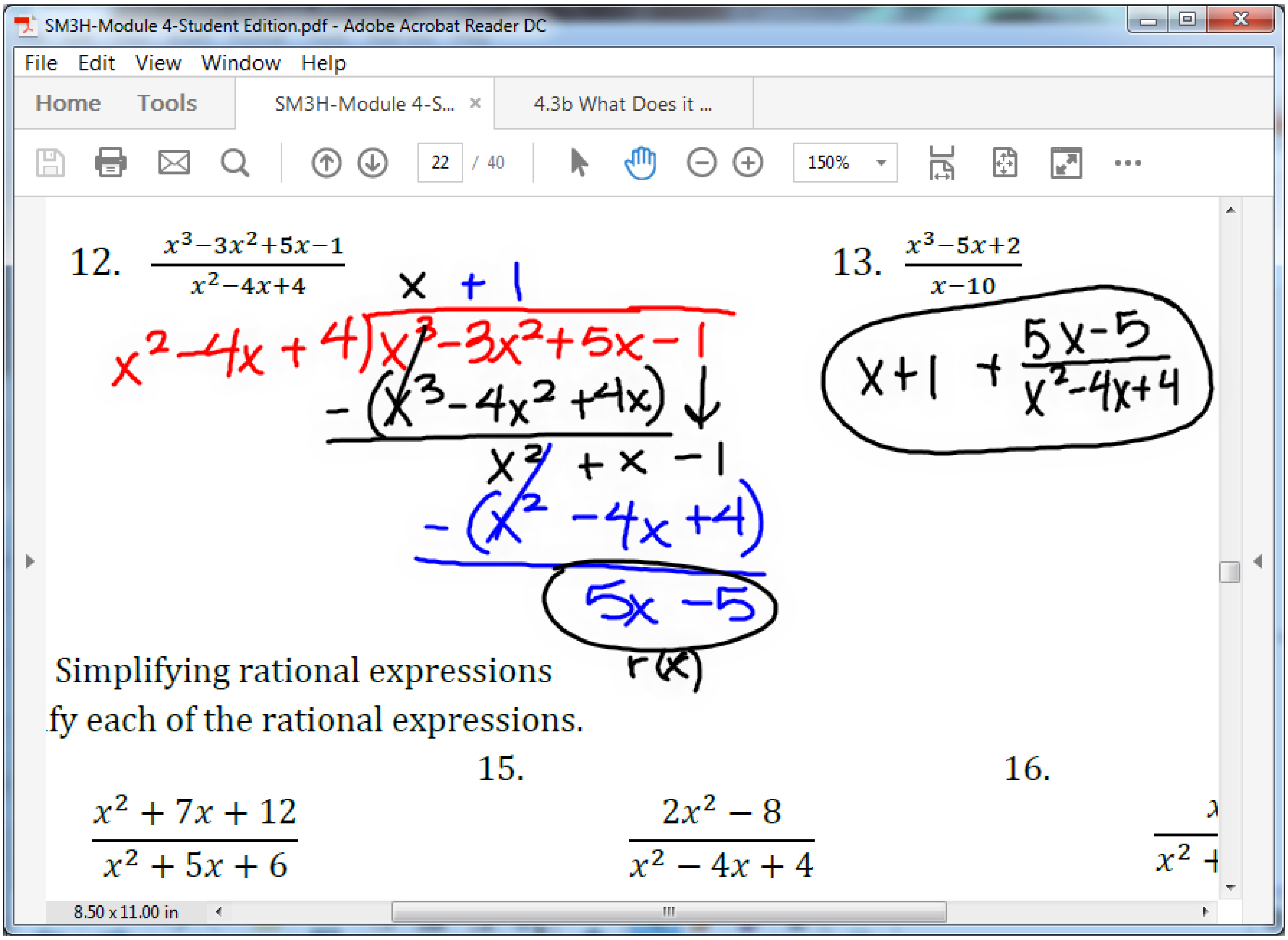
15. $\frac{2x^2-8}{x^2-4x+4}$

16. $\frac{x+4}{x^2+6x+}$

17. $\frac{n+3}{4}\cdot\frac{2(n-6)}{n+3}$

18. $\frac{x+2}{x-5}+\frac{x+3}{x+5}$

19. $\frac{3}{x+6}+\frac{7}{x-}$



12. $\frac{x^3-3x^2+5x-1}{x^2-4x+4}$

$x + 1$

$x^2-4x+4 \overline{)\, \cancel{x^3}-3x^2+5x-1}$

$-(\cancel{x^3}-4x^2+4x) \downarrow$

$\cancel{x^2} + x - 1$

$-(\cancel{x^2} -4x +4)$

$\boxed{5x - 5}$

r(x)

13. $\frac{x^3-5x+2}{x-10}$

$\boxed{x+1 + \frac{5x-5}{x^2-4x+4}}$

Simplifying rational expressions

fy each of the rational expressions.

$\frac{x^2 + 7x + 12}{x^2 + 5x + 6}$

15. $\frac{2x^2 - 8}{x^2 - 4x + 4}$

16.

4.5 Watch Your "Behavior"

A Develop Understanding Task

In this task, you will develop your understanding of the end behavior of rational functions as well a discover the behavior of even and odd functions.

Part I: End behavior of rational functions

After completing the task *The* Gift, Marcus and Hannah were talking about the discussion regarding the end behavior of the parent function $f(x) = \frac{1}{x}$. Marcus said "I thought the end behavior of all functions was that you either ended up going to positive or negative infinity." Hannah agreed, adding "Now we have a function that approaches zero. I wonder if all rational functions will always approach zero as x approaches $\pm\infty$." Marcus replied "I am sure they do. Just like all polynomial functions end behavior approaches either $\pm\infty$, I think the end behavior for all rational functions must approach zero".

1. Could Marcus be right? Make a conjecture about the end behavior of rational functions and test it. (Hint: this should take awhile- be sure to think about the various rational expressions we have studied). As you analyze the end behavior of different rational functions, try to generalize the patterns you notice regarding end behavior.

proper: $(n<d)$

As $x \to -\infty, f(x) \to 0$

As $x \to \infty, f(x) \to 0$

Improper $(n>d)$

As $x \to -\infty, f(x) \to \pm\infty$

As $x \to \infty, f(x) \to \pm\infty$

improper $(n=d)$

As $x \to -\infty, f(x) \to \frac{c}{d}$

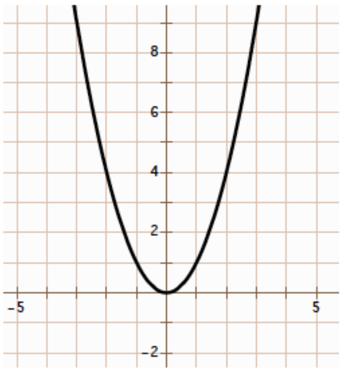
As $x \to \infty, f(x) \to \frac{c}{d}$

where c is the leading coefficient of the numerator, d is the leading coefficient of the denominator, and c/d is their ratio.

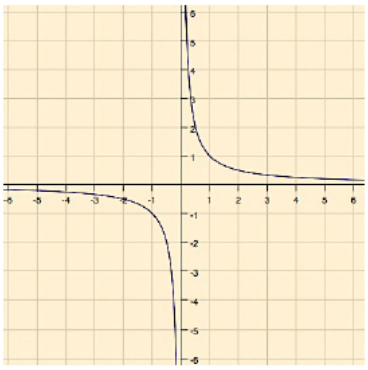
Part II: Even and Odd Functions

Below are three graphs: one represents an even function, one represents an odd function, and one is neither even nor odd.

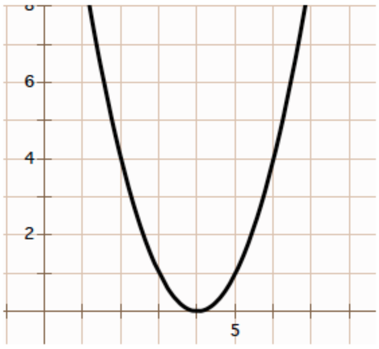
even function: $f(x) = x^2$



odd function: $f(x) = \frac{1}{x}$



neither: $f(x) = (x-4)^2$



2. Use the graphs and their corresponding functions to write a definition for an even function and an odd function.

- A function is an even function if...

- A function is an odd function if ...

3. Below are more functions. Based on your definition, classify as either even, odd, or neither.

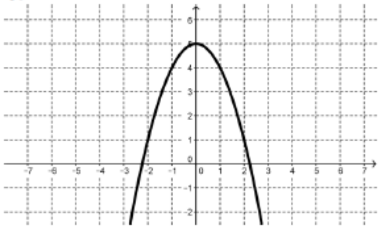
a.

x	y
-2	10
-1	5
0	-4
1	5
2	10

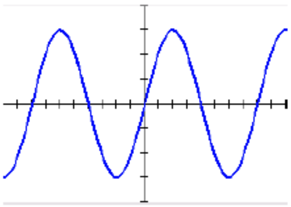
b.

$f(x) = x^4 - 3x + 6$

c.



d.



e.

$f(x) = x^4 - 3$

f.

$f(x) = x^3$

g.

x	y
-2	-10
-1	-5
0	0
1	5
2	10

h.

$f(x) = \sqrt{x+2}$

i.

$f(x) = x(x-2)(x+2)$

4. The answers to question three are at the bottom of this page. Check your solutions and adjust your definitions of even and odd functions, as needed.

4.6 Features of Rational Functions

A Solidify Understanding Task

Part I: Identifying features of rational functions.

Using prior knowledge of other functions you have worked with, determine the features of each rational function and then sketch a graph. (features include intercepts, domain, asymptotes, end behavior*, and any other features you notice about each rational function).

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

$x+1=0$

x-intercept(s):

$x=-1$

$(-1,0)$

y-intercept: $(0, -\frac{1}{4})$ $\frac{1}{-2\cdot 2} = \frac{1}{-4}$

Vertical aysmptote(s):

$x-2=0$

$x=2$

$x+2=0$

$x=-2$

$x=-2,2$

[✓ Proper] or Improper:

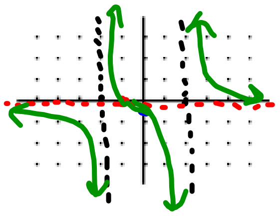
$\frac{d1}{d2}$

End behavior asymptotes*: horizontal asy: $y=0$

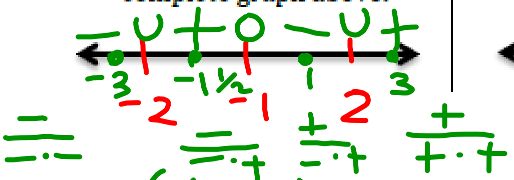
As $x \to -\infty, f(x) \to 0$

As $x \to \infty, f(x) \to 0$

Sketch the features on the graph below:



Create a Sign Line, then complete graph above:



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

2. $f(x) = \frac{x+4}{(x+5)(x+1)}$

x-intercept(s):

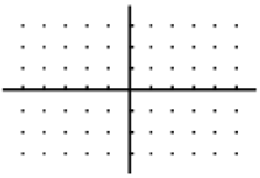
y-intercept:

Vertical aysmptote(s):

Proper or Improper:

End behavior asymptotes*:

Sketch the features on the graph below:



Create a Sign Line, then complete graph above:

$$x+5\overline{)\,x^2+5x+6}$$

x

$-(x+5x)$

$0+6$

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

$x + \frac{6}{x+5}$

x-intercept(s):

$(-3,0)$ $(-2,0)$

y-intercept: $(0, \frac{6}{5})$

Vertical aysmptote(s):

$x = -5$

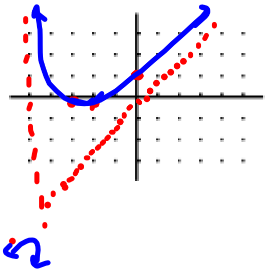
Proper or [✓ Improper:]

End behavior asymptotes*: slant asy. $y=x$

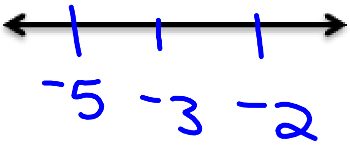
As $x \to -\infty, f(x) \to \infty$

As $x \to \infty, f(x) \to \infty$

Sketch the features on the graph below:



Create a Sign Line, then complete graph above:



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4. Has your conjecture about the end behavior of rational functions changed? Rewrite your conjecture (including any modifications/changes you may have made):

5. Complete the sentence: The domain of a rational function is all real numbers except

____ .

Part II: Sketch a graph of each rational function. Start by graphing the features of the function (same features from Part I), then 'fill in' the rest of the graph using a sign line to guide you.

6. Asymptotes and sign lines

a. $f(x) = \frac{1}{x^2-9}$ b. $f(x) = \frac{-3}{x^2-3x+2}$ c. $f(x) = \frac{2}{(x-1)^2(x+2)}$ d. $f(x) = \frac{1}{x^2}$

7. Roots, asymptotes, and sign lines

a. $f(x) = \frac{-x}{x^2-9}$ b. $f(x) = \frac{x+2}{x^2-2x+1}$ c. $f(x) = \frac{(x-1)(x+2)}{(x^3+4x^2+3x)}$

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

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Homework/Classwork

4.6 "Ready, Set, Go"