Secondary III
Unit 7 Review

Name: Answer Key

Describe how the graph of $g(x)$ is related to the graph $f(x)=\frac{1}{x}$ or $f(x)=\frac{1}{x^2}$.

1. $g(x)=\frac{5}{x}-3$ $\frac{1}{x}$
   - V. Stretch by 5
   - Shift Down 3

2. $g(x)=\frac{-1}{x}+5.$ $\frac{1}{x}$
   - V. Flip
   - Shift up 5

3. $g(x)=-\frac{1}{(x-2)^2}+4$ $\frac{1}{x^2}$
   - V. Flip
   - Shift Right 2
   - Shift Up 4

Use synthetic division to put into transformation form, and then state the transformations.

4. $f(x)=\frac{3x+5}{x-1}=\frac{8}{x-1}+3$

1 | 3 5
  | 3
3 | 8

- V. Stretch by 8
- Shift Right 1
- Shift up 3

5. $f(x)=\frac{x-2}{x+4}=\frac{-6}{x+4}+1$

-4 | 1 -2
   | -4
1 | -6

- V. Flip
- V. Stretch by 6
- Shift Left 4
- Shift up 1

6. $f(x)=\frac{2x-7}{x+1}=\frac{-9}{x+1}+2$

-1 | 2 -7
   | -2
2 | -9

- V. Flip
- V. Stretch by 9
- Shift Left 1
- Shift up 2

Given the following functions, find all holes, vertical asymptotes, x and y intercept and ~~HEB~~ H.A.

8. $f(x)=\frac{x-3}{x^2+6x+5}=\frac{(x-3)}{(x+1)(x+5)}$ $\frac{\deg 1}{\deg 2}$

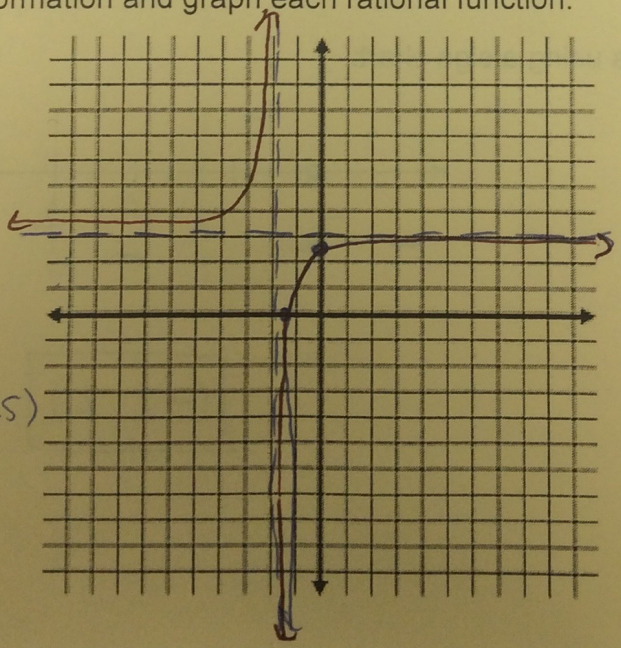
Holes: None
VA: $x=-1,-5$
x-int: $(3,0)$
y-int: $(0,-3/5)$ $\frac{0-3}{(0+1)(0+5)}=\frac{-3}{1\cdot 5}=-3/5$
H.A. $y=0$ (Bottom Heavy)

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

Holes: None
VA: $x=-1$
x-int: $(2,0), (-2,0)$
y-int: $(0,-4)$ $\frac{(0-2)(0+2)}{(0+1)}=\frac{(-2)(2)}{1}=-4$
HA: $y=$ slant asymptote (Top Heavy)

Find the following information and graph each rational function:

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

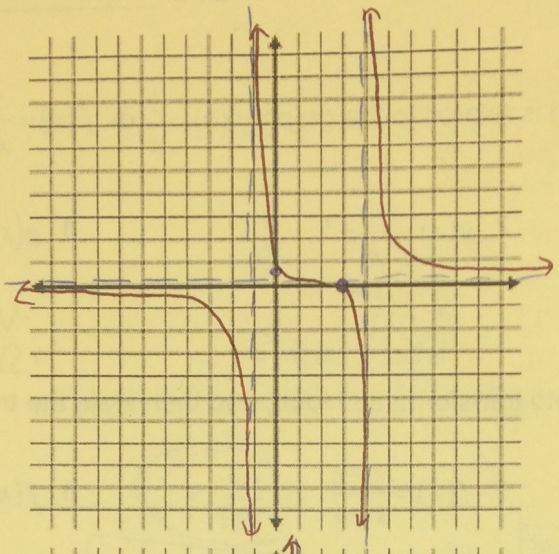


Holes: None
VA: $x=-2$
x-int: $(-5/3,0)$
y-int: $(0,5/2)$ or $(0,2.5)$
HA: $y=\frac{3}{1}=3$

Domain: $(-\infty,-2)\cup(-2,\infty)$
Range: $(-\infty,3)\cup(3,\infty)$
Increasing: $(-\infty,-2)\cup(-2,\infty)$
Decreasing None
End Behavior: $\lim_{x\to-\infty} f(x)=3$ $\lim_{x\to+\infty} f(x)=3$

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

11. $f(x)=\dfrac{x-3}{x^2-3x-4}$



Holes: None

VA: $x=4,\ x=-1$

x-int: $(3,0)$

y-int: $(0,3/4)$

HA: $y=0$

Domain: $(-\infty,-1)\cup(-1,4)\cup(4,\infty)$

Range: $(-\infty,\infty)$

Increasing: None

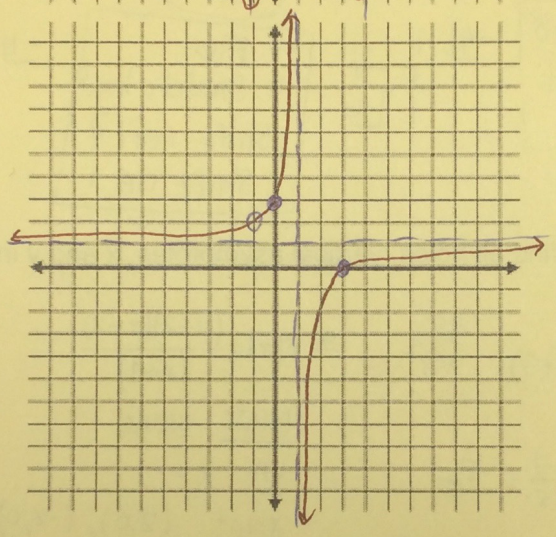
Decreasing $(-\infty,-1)\cup(-1,4)\cup(4,\infty)$

End Behavior:

$\lim_{x\to-\infty} f(x)=0$ $\lim_{x\to+\infty} f(x)=0$

12. $f(x)=\dfrac{x^2-2x-3}{x^2-1}$

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



Holes: $x=-1$

VA: $x=1$

X-int: $(3,0)$

y-int: $(0,3)$

HA: $y=1$

Domain: $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$

Range: $(-\infty,1)\cup(1,\infty)$

Increasing: $(-\infty,1)\cup(1,\infty)$

Decreasing None

End Behavior:

$\lim_{x\to-\infty} f(x)=1$ $\lim_{x\to+\infty} f(x)=1$

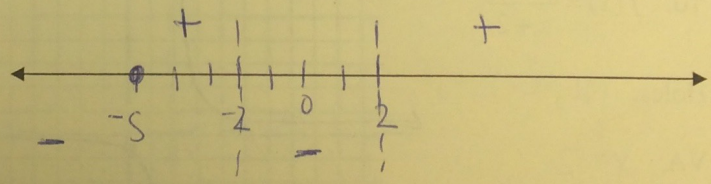
Solve the following inequalities using a sign chart:

13. $\dfrac{x+5}{x^2-4}<0$ Below w/ Round

$\frac{x+5}{(x+2)(x-2)}<0$

VA: $x=-2,2$

x-int: $(-5,0)$



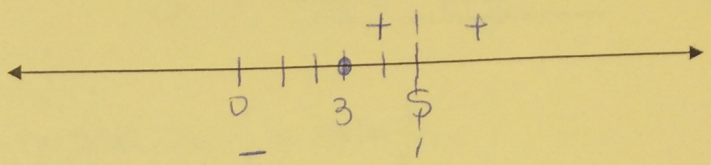
$(-2,2)$

$\frac{x-3}{(x-5)(x-5)} \geq 0$

14. $\frac{x-3}{x^2-10x+25} \geq 0$ Above w/ square on x-int

x-int: (3, 0)

VA: $x = 5$



~~$(-\infty, 3] \cup (5, \infty)$~~ $[3, 5) \cup (5, \infty)$

15. If the degree is the same in the numerator and denominator, the asymptote is found by dividing the leading coefficients

16. If the degree in the denominator is larger than the numerator, they asymptote will be at ~~a horiz asymptote~~ $y = 0$ bottom heavy ~~top heavy~~

17. If the degree in the numerator is larger than the degree in the ~~numerator~~ denominator, the asymptote will be a $y =$ slant asymptote top heavy