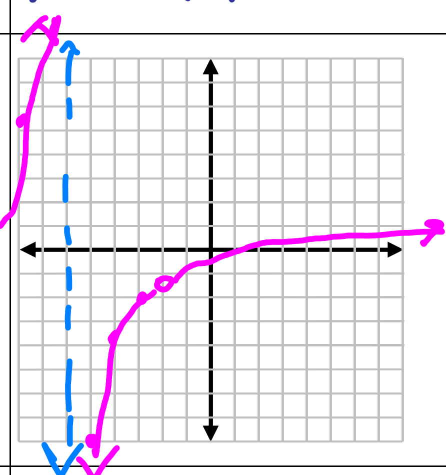
Rational Functions Roundtable Name:________________________________

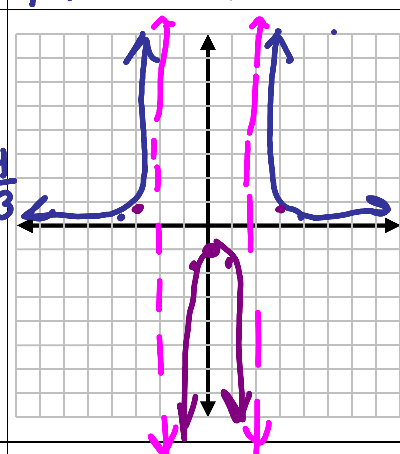
$$f(x) = \frac{x^2 - x - 6}{x^2 + 8x + 12}$$

1. Factor the numerator and denominator of the rational function and simplify.	$f(x) = \frac{(x-3)(x+2)}{(x+6)(x+2)}$ $= \frac{(x-3)}{(x+6)}$
2. Determine any discontinuities. If a discontinuity is removable (hole), state the ordered pair. If the discontinuity is infinite (vertical asymptote), state the equation of the vertical asymptote.	$x = -6$ vertical asymptote $(-2, -5/4)$ hole
3. Determine the end behavior using limits.	$\lim_{x\to-\infty} f(x) =$ __1__ $\lim_{x\to\infty} f(x) =$ __1__
4. Write the equation of any horizontal asymptotes.	$y=1$
5. Find the x-intercept (s) and y-intercept	y-int → $(0, -1/2)$ x-int → $(3, 0)$
6. Make a table of values and sketch the graph	
7. Use limits to give the behavior of the function **near the vertical asymptotes**.	$\lim_{x\to -6^-} f(x) = \infty$ $\lim_{x\to -6^+} f(x) = -\infty$
8. Determine the **domain** and **range** of the function.	D $(-\infty, -6) \cup (-6, -2) \cup (-2, \infty)$ R $(-\infty, -5/4) \cup (-5/4, 1) \cup (1, \infty)$ $(-\infty, -1.25)$ $(-1.25, 1)$ $(1, \infty)$

-9	-8	-7	-6	-5	-4	-3
4	5.5	10	und	-8	-3.5	-2

Rational Functions Roundtable Name:____________________________

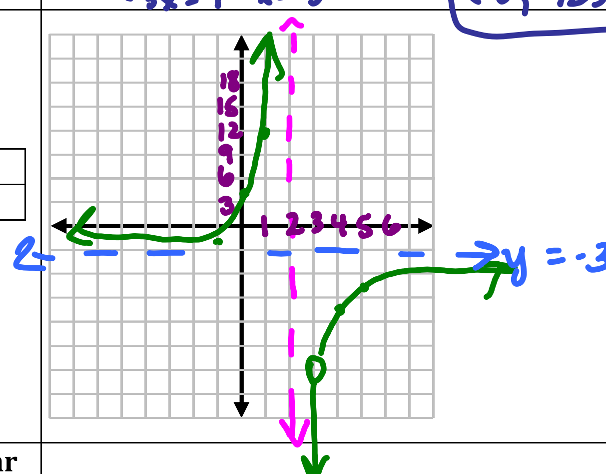
$g(x) = \frac{4}{x^2 - 4}$

1. Factor the numerator and denominator of the rational function and simplify.	$f(x) = \frac{4}{(x-2)(x+2)}$
2. Determine any discontinuities. If a discontinuity is removable (hole), state the ordered pair. If the discontinuity is infinite (vertical asymptote), state the equation of the vertical asymptote.	vertical asymptotes $x = 2$ $x = -2$
3. Determine the end behavior using limits.	$\lim_{x\to-\infty} f(x) =$ <u>0</u> $\lim_{x\to\infty} f(x) =$ <u>0</u>
4. Write the equation of any horizontal asymptotes.	$y = 0$
5. Find the x-intercept (s) and y-intercept	$0 = \frac{4}{x^2-4}$ $4 \neq 0$ no x-int. $y = \frac{4}{0-4} = -1$ $\boxed{(0,-1)}$
6. Make a table of values and sketch the graph	
7. Use limits to give the behavior of the function **near the vertical asymptotes**.	$\lim_{x\to-2^-} f(x) = \infty$ $\lim_{x\to-2^+} f(x) = -\infty$ $\lim_{x\to2^-} f(x) = -\infty$ $\lim_{x\to2^+} f(x) = \infty$
8. Determine the **domain** and **range** of the function.	D $(-\infty,-2) \cup (-2,2) \cup (2,\infty)$ R $(-\infty,-1] \cup (0,\infty)$

-4	-3	-2	-1	0	1	2	3	4
.3	0.8	und	-1.3	-1	-1.3	und	0.8	.3

Rational Functions Roundtable **Name:**________________________________

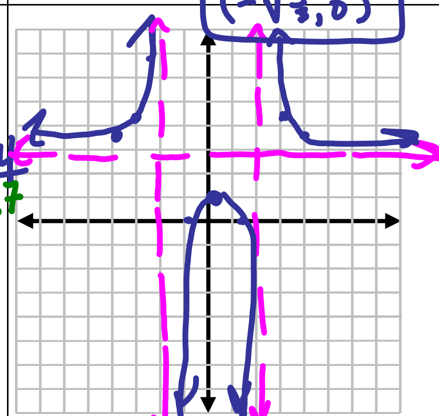
$$h(x) = \frac{27 - 3x^2}{x^2 - 5x + 6}$$

1. Factor the numerator and denominator of the rational function and simplify.	$\frac{-3(x^2-9)}{(x-3)(x-2)} = \frac{-3\cancel{(x-3)}(x+3)}{\cancel{(x-3)}(x-2)}$ $\frac{-3(x+3)}{(x-2)}$
2. Determine any discontinuities. If a discontinuity is removable (hole), state the ordered pair. If the discontinuity is infinite (vertical asymptote), state the equation of the vertical asymptote.	hole at $(3, -18)$ V.A. at $x = 2$
3. Determine the end behavior using limits.	$\lim_{x\to-\infty} f(x) =$ <u>-3</u> $\lim_{x\to\infty} f(x) =$ <u>-3</u>
4. Write the equation of any horizontal asymptotes.	$\lim_{x\to-\infty} f(x) = -3$ $\lim_{x\to\infty} f(x) = -3$
5. Find the x-intercept (s) and y-intercept	$0 = \frac{-3(x+3)}{(x-2)}$ $\boxed{(-3,0)}$ $-3x-9=0$ $-3x=9$ $x=-3$ $y = \frac{-3(3)}{-2} = \frac{9}{2}$ $\boxed{(0, 9/2)}$
6. Make a table of values and sketch the graph	
7. Use limits to give the behavior of the function **near the vertical asymptotes**.	$\lim_{x\to2^-} f(x) = \infty$ $\lim_{x\to2^+} f(x) = -\infty$
8. Determine the **domain** and **range** of the function.	D $(-\infty,2)\cup(2,3)\cup(3,\infty)$ R $(-\infty,-18)\cup(-18,-3)\cup(-3,\infty)$

-1	0	1	2	3	4	5
2	4.5	12	und	und	-10.5	-8

Rational Functions Roundtable Name:________________________

$$k(x) = \frac{6x^2 - 8}{2x^2 - 8}$$

1. Factor the numerator and denominator of the rational function and simplify.	$\frac{\cancel{2}(3x^2-4)}{\cancel{2}(x^2-4)} = \frac{3x^2-4}{(x-2)(x+2)}$
2. Determine any discontinuities. If a discontinuity is removable (hole), state the ordered pair. If the discontinuity is infinite (vertical asymptote), state the equation of the vertical asymptote.	vertical asymptotes $x=2$ $x=-2$
3. Determine the end behavior using limits.	$\lim_{x\to-\infty} f(x) =$ 3 $\lim_{x\to\infty} f(x) =$ 3
4. Write the equation of any horizontal asymptotes.	$y=3$
5. Find the x-intercept (s) and y-intercept	$0 = \frac{3x^2-4}{(x-2)(x+2)}$ $3x^2-4=0$ $x = \pm\sqrt{\frac{4}{3}}$ $\boxed{(\pm\sqrt{\frac{4}{3}},0)}$ $y = \frac{0-4}{(0-2)(0+2)} = \frac{-4}{-4}$ $(0,1)$
6. Make a table of values and sketch the graph	
7. Use limits to give the behavior of the function **near the vertical asymptotes**.	$\lim_{x\to-2^-} f(x) = \infty$ $\lim_{x\to-2^+} f(x) = -\infty$ $\lim_{x\to2^-} f(x) = -\infty$ $\lim_{x\to2^+} f(x) = \infty$
8. Determine the **domain** and **range** of the function.	R: $(-\infty,1] \cup (3,\infty)$

D $(-\infty,-2) \cup (-2,2) \cup (2,\infty)$

-4	-3	-2	-1	0	1	2	3	4
3.7	4.6	und	.3	1	.3	und	4.6	2.7