Name:_____   Date assigned:_____   Band:_____

Precalculus | Packer Collegiate Institute
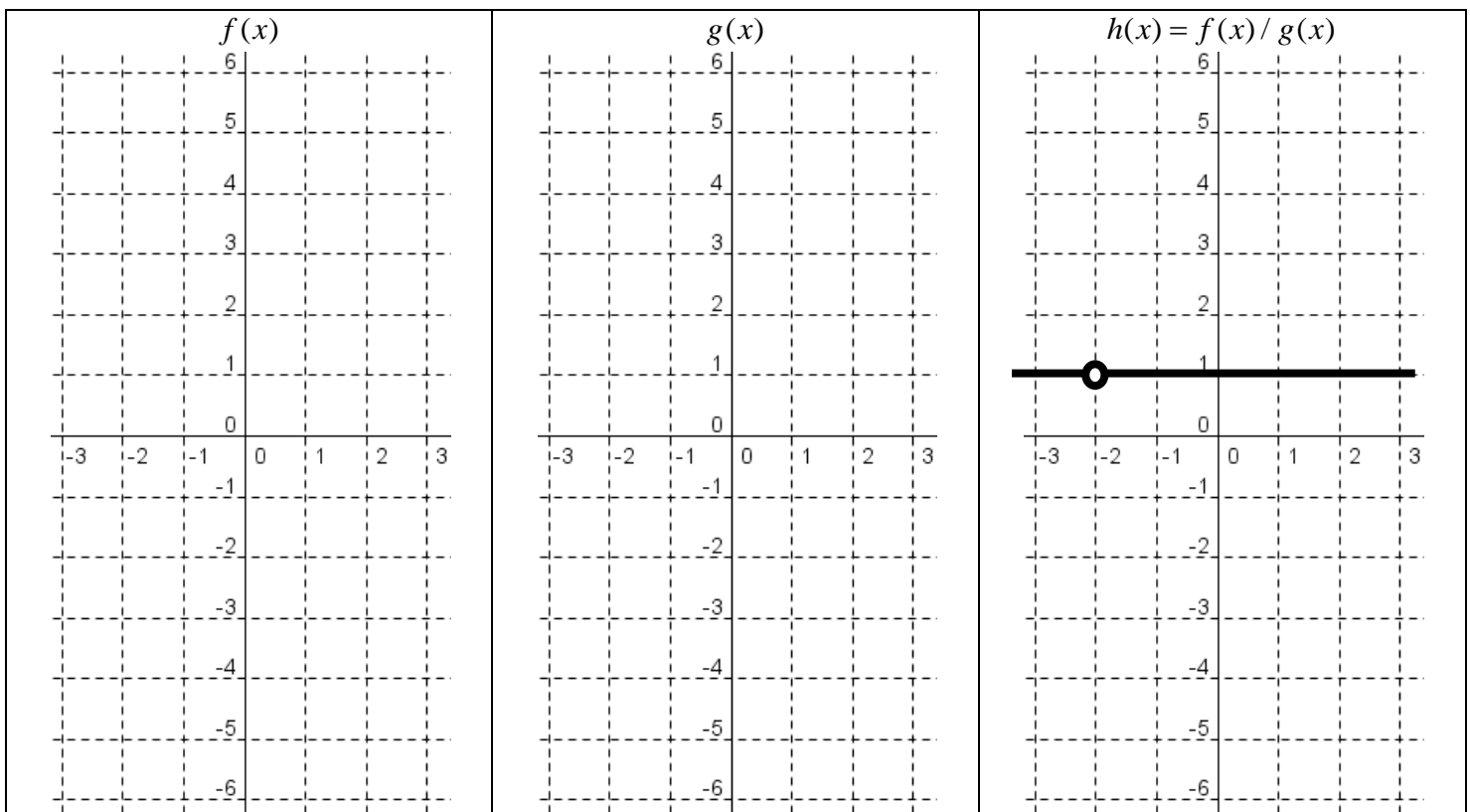

Assessment on Rational Functions

Remember to get full credit, you need to show all work, <u>clearly and neatly.</u> Remember, this isn't just about you getting the answer, but you showing someone else how you got the answer.

You may not use a calculator on this assessment.

1. (a) Draw two functions $f(x)$ and $g(x)$ so that their quotient gives us the graph that results.

(b) Explain why you have that hole in the quotient graph, and **why** it appears where it does, based on the previous two graphs. Use the graphs to explain your answer, not algebraic equations.

`

2. Write an equation for the following two rational functions. You may leave the numerator and denominator in factored form.

(a)

Equation:

(b)
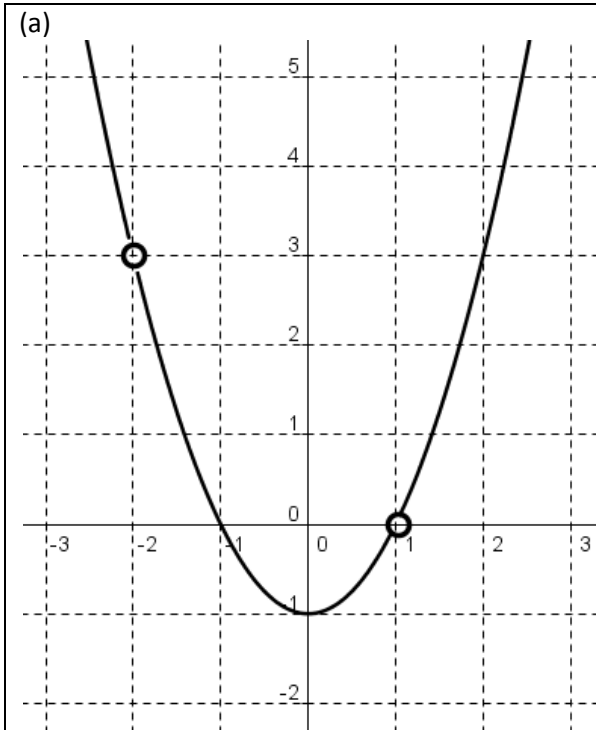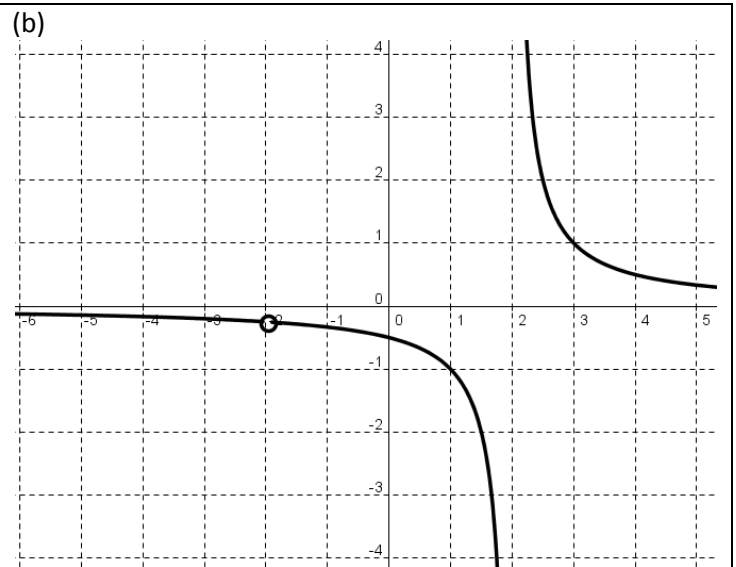
Equation:

3. Explain as well as you can **why** $f(x) = \dfrac{1}{x}$ has a vertical asymptote at $x=0$. In your response, be sure to explain what a vertical asymptote is graphically, and how the equation gives rise to that sort of graphical behavior.

4. (a) Write an equation of a rational function with vertical asymptotes at $x=-2$ and $x=3$, a hole at $x=5$, and x-intercepts at $x=-6$ and $x=7$.

(b) What the domain of that function you created in part (a)? Give your answer in interval notation.

`

5. Explain as clearly as you can, to someone in Algebra II, **why** $f(x) = \dfrac{x^2 - 5}{x^2 + 10}$ will have a horizontal asymptote at $y = 1$.

6. Find the end behavior of the following (if there is a horizontal asymptote, list it, if there is no horizontal end behavior, explain what's going on for very large positive and very large negative x-values.

$f(x) = \dfrac{3x^3 - x - 1}{5x^2 + x^5}$	$g(x) = \dfrac{4x - 1}{5x + 1}$	$h(x) = \dfrac{2x - 3}{3x^2 + x - 2}$

7. The purpose of sign analyses are to give us a sense of when a rational function changes from being above the x-axis to below the x-axis. They can tell us quite a lot about the shape of a graph, even if we don't know anything else. We determined there were only three features on a graph that **might** result in a sign change.

These features are: <u>x-intercepts,</u> _____, and _____.

Pick one of those other two features and draw an example of a graph where there **is** a sign change at that feature, and an example of a graph where there **is not** a sign change at that feature.
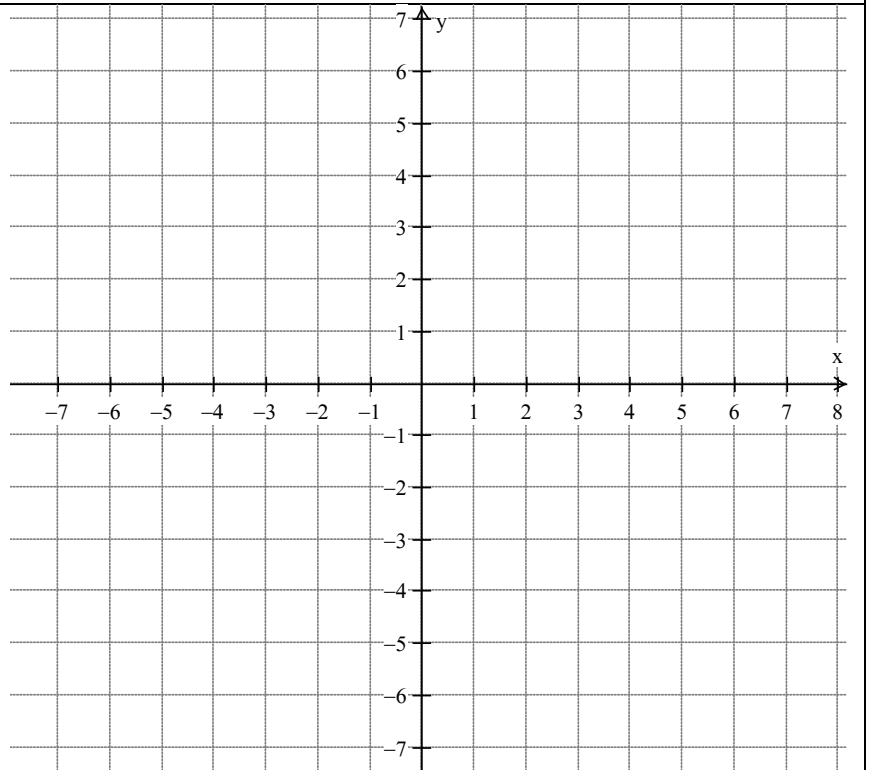
The feature I chose is: _____

... is a sign change	... is not a sign change

`

8. For the following rational functions, find the x-intercepts, the holes, the vertical asymptotes, the sign analysis, and the end behavior. Then come up with a decent sketch of the graph.

(a) $f(x) = \dfrac{x^2 - 1}{x^2 - 3x - 4}$
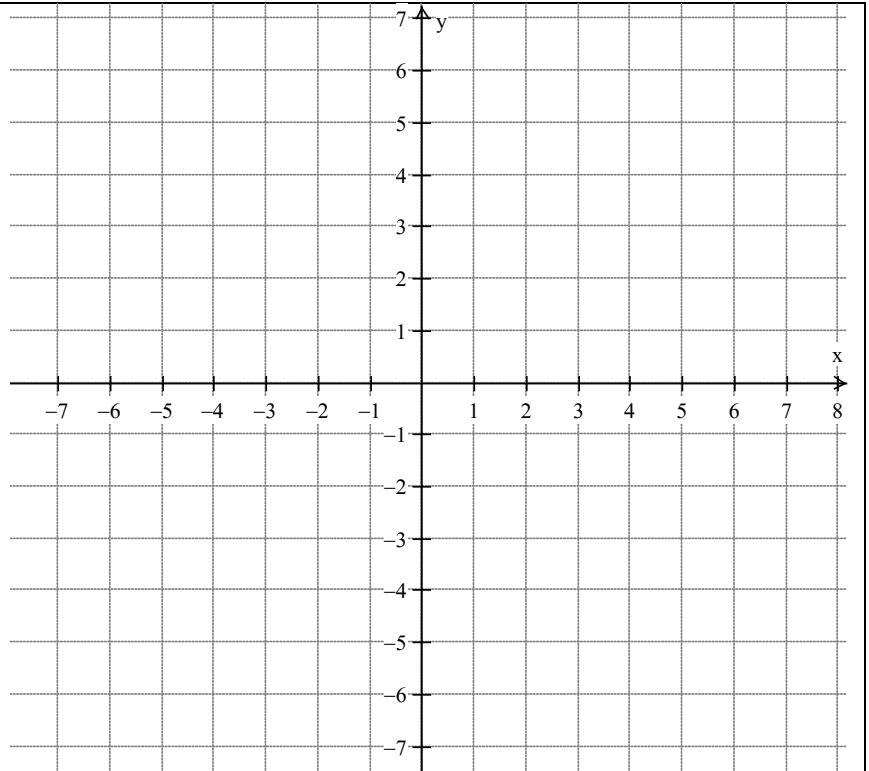
(b) $g(x) = \dfrac{x + 2}{x^2 - 9}$

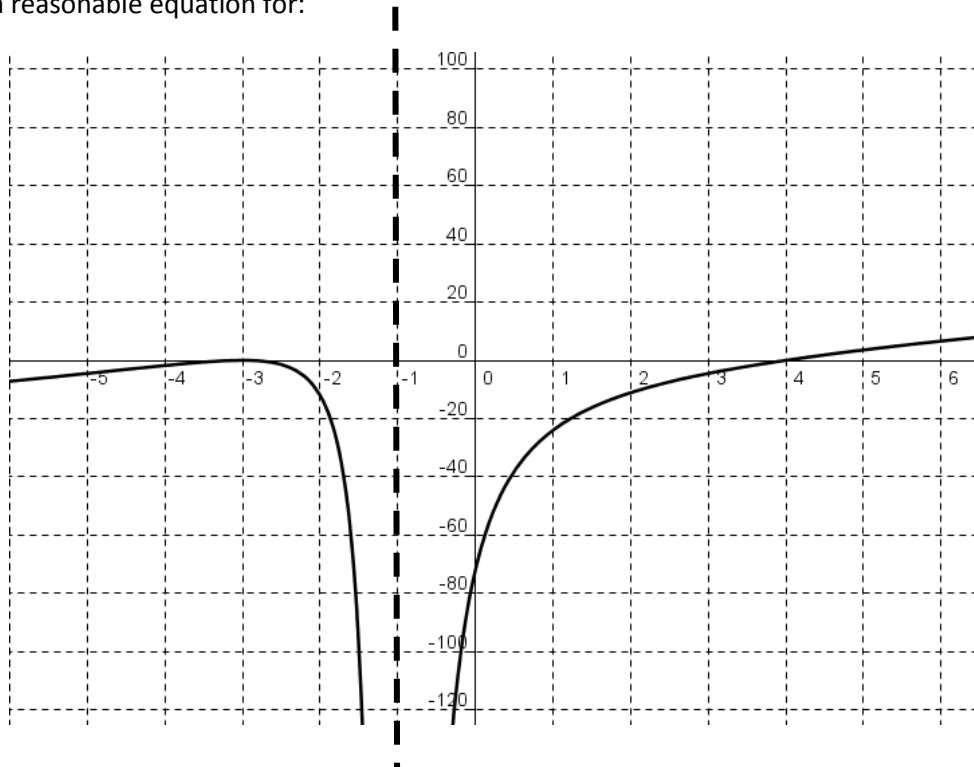9. Let $h(x) = \dfrac{2(x+1)(x-8)}{(x-2)^2}$.

WORK SPACE

(a) When is $h(x) \geq 0$?

(b) When is $h(x) < 0$?

10. (a) When graphed, the rational function $r(x) = \dfrac{(x+1)(x-4)}{(x+1)}$ will look like:

(b) The rational function $r(x)$ has a hole. What is the *height* of the hole? How do you know?

`

Extra Credit: Find a reasonable equation for:

INTEGRITY STATEMENT:

"On my personal integrity, I have not given, nor received, nor witnessed any unauthorized assistance on this exam."_____

   (signature)

If you can't sign this in good conscience, please don't. Come speak to me.

`