Name ________________________

Class ________________________

Problem 1

A rational function is the quotient of two polynomial functions where the polynomial function in the denominator is of degree 1 or higher. To understand the behavior of rational functions better, let's examine the polynomial functions that make them up.

Graph the function $f(x) = 2x^2 - 8$ on page 1.4. This function will become the ***numerator*** of the rational function.

1. What is the y-intercept of the numerator of the rational function?

2. How does the equation show what the y-intercept of the rational function will be?

3. Use the **Trace** function to find the zeros of the function.

Completely factor the function $f(x) = 2x^2 – 8$.

Return to page 1.4 and enter the factored form of $f(x) = 2x^2 - 8$ in **f2**. Change the line weight to thick.

4. How does the factored form relate to the zeros of the function?

On page 2.2, enter the function $f(x) = x^2 - 16$ in **f1**. This will eventually be the ***denominator*** of the function later on.

5. What is the y-intercept of the denominator?

6. How does the equation show what the *y*-intercept will be?

7. Use **Graph Trace** to find the zeros.

Enter the factored form of $f(x) = x^2 - 16$ in **f2** on Page 2.2. Change the line weight of **f2** to thick.

8. How does the factored form relate to the zeros of the function?

On page 2.7, re-enter the graph of $\mathbf{f1}(x) = 2x^2 - 8$ and $\mathbf{f2}(x) = x^2 - 16$.

You will now graph the rational function: $f(x) = \dfrac{2x^2 - 8}{x^2 - 16}$ into **f3**.

Note: Since $\mathbf{f1}(x) = 2x^2 - 8$ and $\mathbf{f2}(x) = x^2 - 16$, enter $\dfrac{\text{f1}(x)}{\text{f2}(x)}$ into ***f*3**.

9. What are the zeros of the function $f(x) = \dfrac{2x^2 - 8}{x^2 - 16}$?

10. In **Graph Trace** mode on **f3**, move the cursor to $x = 4$. What happens?

What about when $x = -4$?

11. What is the *y*-intercept of the rational function?

12. Unhide **f1** and **f3**. Where do the numerator's parabola and the rational function intersect? Where do the denominator's parabola and the rational function intersect?

13. Drag the functions **f1** and **f3**. How does changing them affect the rational function?

