Name: ______________________________

Exploring Rational Functions using the Graphing Calculator

1. Let's explore the behavior of $f(x)=\dfrac{2x^2-8}{x^2-16}$

a. Factor $f(x)=$ ____

b. What are the x-intercepts of f(x)? ______________________

c. How did you find the x-intercepts?______________________

d. What is the y-intercept? _____________________________

e. What are the vertical Asymptotes? ______________________

f. Are there any holes in this graph? ______________________

g. What is the Horizontal Asymptote? ______________________

2. Type f(x) into the calculator and hit the GRAPH key to look at its graph. Do your answers for 1(a) – 1(g) match what you see? If not, go back and change any wrong answers.

3. Let's look at the behavior of f(x) as $x \to -4^+$

a. Find the following x-values (Hit TRACE and then type in each x-value)

   a. f(-3) =

   b. f(-3.5) =

   c. f(-3.8) =

   d. f(-3.9) =

   e. f(-3.999) =

   f. f(-3.999999) =

   g. f(-4) =

b. Where does f(x) seem to be going as $x \to -4^+$?_____________

c. Why is there no value for f(-4)? ________________________

4. Let's look at the behavior as f(x) as $x \to -4^-$

a. Find the following x-values
   a. f(-4.5) =
   b. f(-4.01) =
   c. f(-4.00001) =

b. Where does f(x) seem to be going as $x \to -4^-$? ___________

5. Let's find out what happens as x increases without bound!

a. Change your viewing window: y[-100, 100]   yscl: 10
   x[-10,000, 10,000] xscl: 1,000

b. Notice you can't see the graph anymore (that's okay for right now)

c. Find the following x-values (Hit TRACE and then type in each x-value)
   a. f(100) =
   b. f(1000) =
   c. f(7,000) =
   d. f(9,000) =
   e. f(10,000) =

d. What number does f(x) seem to be approaching? _________

e. Change your window back to the standard viewing window (ZOOM 6)

f. Hit TRACE and then press and hold down the left arrow button. Your graph will begin to shift. As you move left across the graph, x is getting more and more negative. What number does f(x) seem to be approaching? ______________

6. Type in the following rational functions and sketch their graphs.

a. $f(x) = \dfrac{5x-10}{x^2-3x-10}$

b. $f(x) = \dfrac{x^2-2x-3}{3x+6}$

7. How did you know 6(b) was going to have an oblique asymptote?

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8. What is the Oblique asymptote?____________________________