PAP Algebra 2 **Name:_____**

Explore/Explain: Rational Function Graphing with Removable Discontinuities

1. Enter $y = \frac{x-3}{x+5}$ in your calculator

   a. What is the equation of the vertical asymptote?

   b. What happens on the graph at the vertical asymptote?

   c. What happens on the table at the vertical asymptote?

   d. What is the domain of the function?

   e. What happens to the graph way off to the right or left where the graph levels off?

   f. What is the equation of the horizontal asymptote?

   g. What is the range of the function?

To find horizontal asymptotes, you need to know what happens to the graph way off to the right/left where the graph levels off. To use the calculator you can do the following:
~Plug in 100 for x what does y =_____?
~Plug in 1000 for x what does y = __?
Then you can see what y is approaching to determine the HA.
Hint – 2nd, Window and change your start value on your table, then go back to your table for values
- COCO, BOBO, BOTN might help as well!!!

2. Enter $y = \frac{4x-3}{x+2}$ in your calculator.

   a. What is the equation of the vertical asymptote?

   b. What happens on the graph at the vertical asymptote?

   c. What happens on the table at the vertical asymptote?

   d. What is the domain of the function?

   e. What happens to the graph way off to the right or left where the graph levels off?

   f. What is the equation of the horizontal asymptote?

   g. What is the range of the function?

3. Enter $y = \dfrac{2x^2 - 4x}{x - 2}$ in your calculator.

   a. What does the graph look like?

   b. Factor the numerator. (hint: take out a 2x, the GCF)

   c. Cancel what matches in both the numerator and the denominator. What is left?

   d. How does the function in part d, compare to what you saw in the graph?

   e. What happens at x = 2? (Check the table using your calculator.)

      This is called a **removable discontinuity**. Removable discontinuities in the graph don't show on the graph in the calculator because it is a single point on the graph. They only show in the table.
      Now, in Y2, put your simplified function from part d. Go to the table and look at x=2? What do you notice under the Y2 column?

   g. What are the coordinates (x , y) of the removable discontinuity in the graph?

   h. Why does the removable discontinuity show an error in Y1 but the actual y-value of the removable discontinuity in Y2?

   i. What are the domain and range of the rational function?

      <u>Domain:</u>

      <u>Range:</u>

4. Enter $y = \dfrac{x + 3}{2x^2 + 7x + 3}$ in your calculator.

   a. What does the graph look like?

   b. Factor the denominator and cancel. What should be the x-value of the removable discontinuity?

   c. Put your original equation in the calculator in Y1 and the simplified equation in Y2 and look at the table. Find the location of the removable discontinuity on the table.

   d. Go to TBLSET and change ΔTbl = 0.5 on your graphing calculator to change the scale. Where is the vertical asymptote? How do you know from the table that this is not another removable discontinuity?

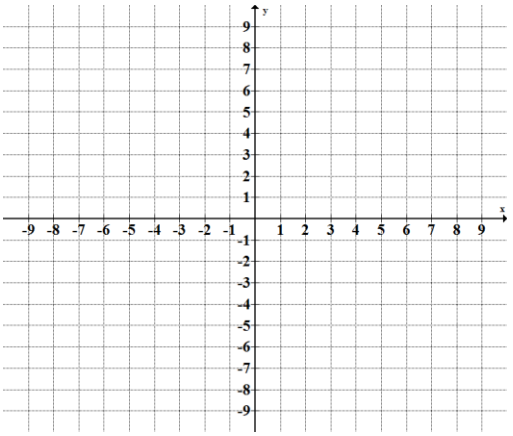
e. What is the domain? (did you take into account both the vertical asymptote and the removable discontinuity?)

f. Where is the horizontal asymptote?

g. What is the range? (did you take into account both the horizontal asymptote and the removable discontinuity?)

STOP: wait for Class and put your Calculator AWAY!

5. $f(x)=\dfrac{(x+2)}{x^2+5x+6}$



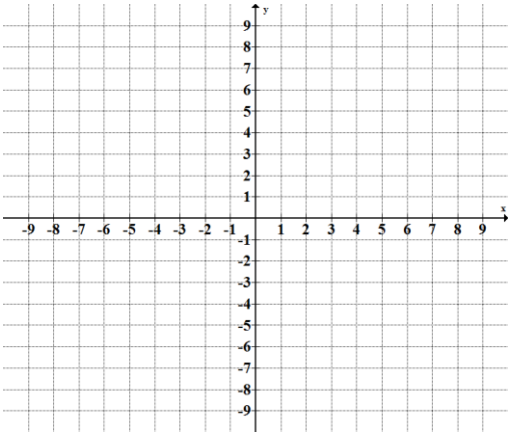
VA:_____

HA: _____

Hole (if any): _____

Domain: _____ Range: _____

7. $f(x)=\dfrac{2x+4}{x^2-4}$



VA:_____

HA: _____

Hole (if any): _____

Domain: _____ Range: _____