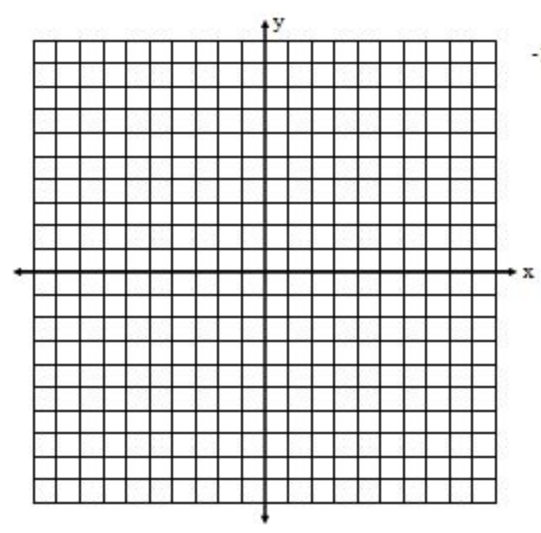
**Warm Up:** Identify the type of problem. Write down the steps to solving the following problems. Simplify or solve completely and find the values of x for which the expression or equation is undefined.

1.

2.

3.

A function whose rule can be written as a **ratio of two polynomials,** such that is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



|  |  |
| --- | --- |
| x |  |
| -2 |  |
| -1 |  |
|  |  |
| 0 |  |
|  |  |
| 1 |  |
| 2 |  |

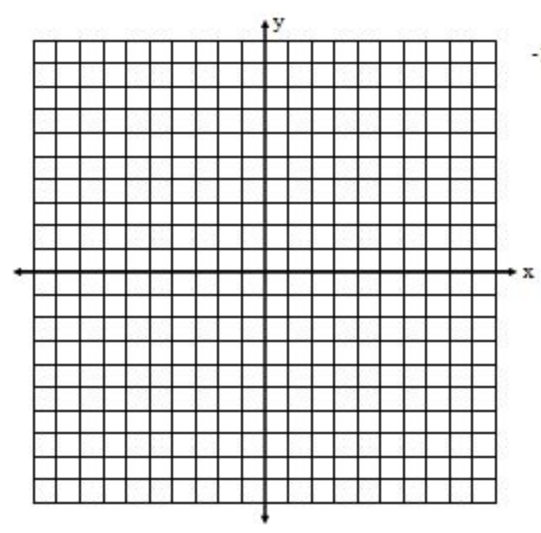
The parent rational function is:

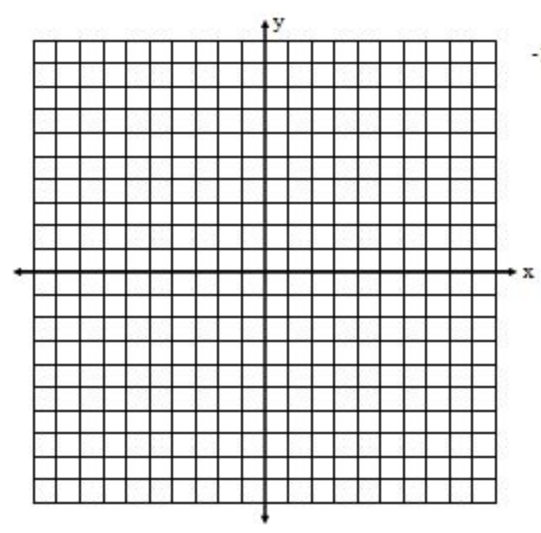
Its graph is a hyperbola, which has two separate branches. A rational function may have horizontal and vertical asymptotes. The function has a vertical asymptote at and a horizontal asymptote at

**Transformation of Rational Functions**

Rational Functions can be transformed as follows:

Describe the tranformation and graph the following. Identify the domain, range and asymtotes.





1. 2.

Transformations: Transformations:

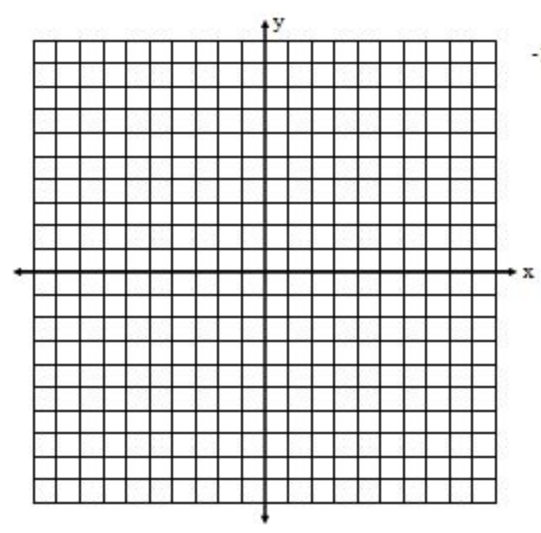
Vertical Asymptote: Vertical Asymptote:

Domain: Domain:

Horizontal Asymptote: Horizontal Asymptote:

Range: Range:

**Exploration:**



**Part 1:** Given,

1. Factor the numerator to find the zeros of

Factor the denominator to find the zeros of .

2. Graph the function using your graphing calculator. What do you notice about the roots of based on the graph?

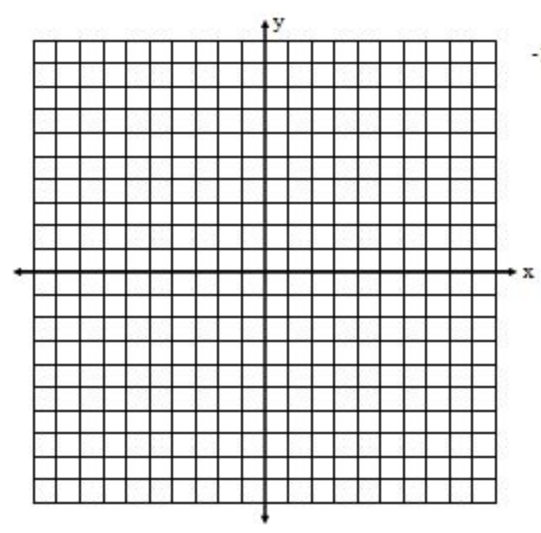
Zeros of are: y-intercept:

Vertical Asymptotes of are:

Domain:

Range:

**Part 2:** Now graph



1. Graph the function using your graphing calculator. What do you notice abouit the roots of based on the graph?

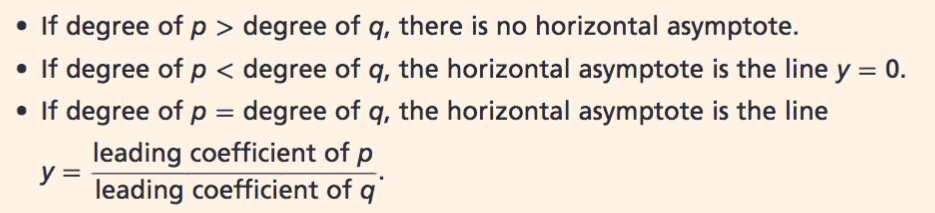
Zeros of are: y-intercept:

Vertical Asymptotes of are:

Domain:

Range:

**Horizontal Asymptotes:**

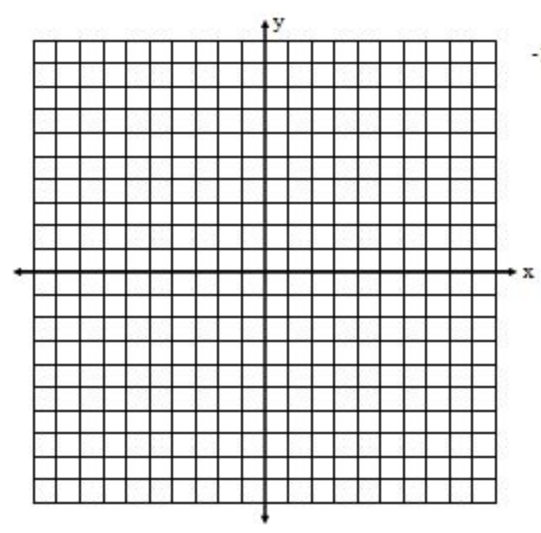


**Identify zeros and any asymptotes or holes for each function.**

1.2.3.

4. 5.

**Exploration II: Use your graphing calculator to graph the functions below. Identify the zeros, vertical and horizontal asymptotes, domain and range.**



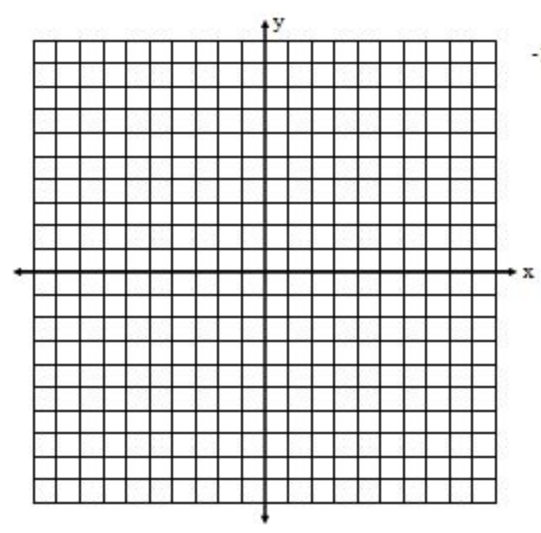
Zeros: y-intercept:

Vertical Asymptote:

Domain:

Horizontal Asymptote:

Range:



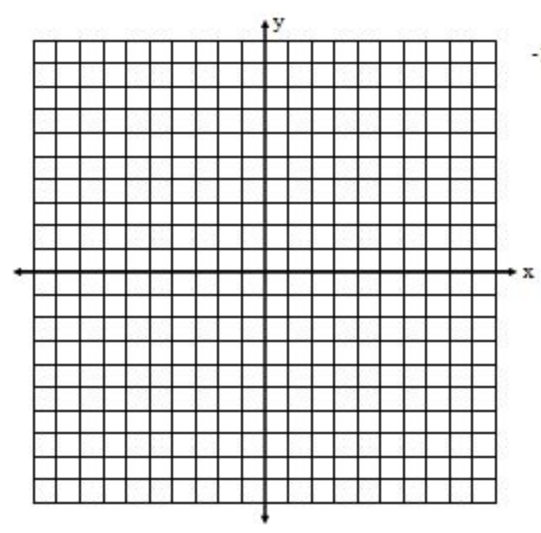
Zeros: y-intercept:

Vertical Asymptote:

Domain:

Horizontal Asymptote:

Range:



Zeros:

Vertical Asymptote:

Domain:

Horizontal Asymptote:

Range:

**SUMMARY:**

The process for graphing rational functions of the form: is:

1. Identify the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Find the y-intercept:
2. Identify the holes, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ asymptotes.
3. Plot the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Use a table of values to identify additional \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the function’s graph.
5. Draw each branch with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.