# Strategy for graphing Rational Functions

MAC 1140
Section 3.6

1) Write the function in lowest terms (if possible), keeping in mind the domain of the original function.

2) Find any vertical asymptotes. (These will be located where the function is undefined…..values of $x$ that make the denominator equal zero.)

3) Find horizontal asymptote:

$$f(x) = \frac{p(x)}{q(x)}$$

let *p(x)* be of degree **n** and *q(x)* be of degree **m,** then:

a) If n < m, $y = 0$ is the horizontal asymptote.

b) If n = m, the horizontal asymptote is :

$$y = \frac{\textit{leading coefficient of } p(x)}{\textit{leading coefficient of } q(x)}$$

c) If n > m, there is no horizontal asymptote. If n is greater than m by one degree, then divide *p(x)* by *q(x)* to find the slant (oblique) asymptote.

4) Find the $x$ and $y$ intercepts.

5) If there is a horizontal asymptote, see if the function has a horizontal asymptote intercept.

Example: H.A.: y = 2 ( ____ , 2 ) ← find the ordered pair that has $y$-coordinate 2.

6) Putting all intercepts and asymptotes in their correct locations, graph the branches of your rational function.

7) State the domain and range of your function.

8) Check your function with your graphing calculator to verify that you have everything in the right place. (You may also need to use the max/min feature of your calculator to help you state the range of the function.)