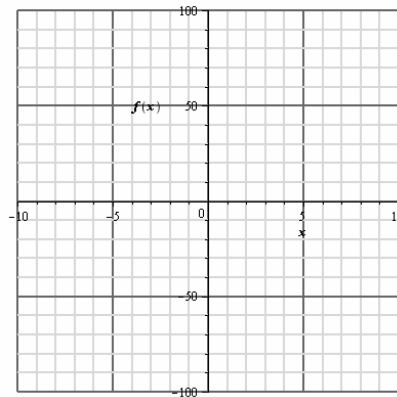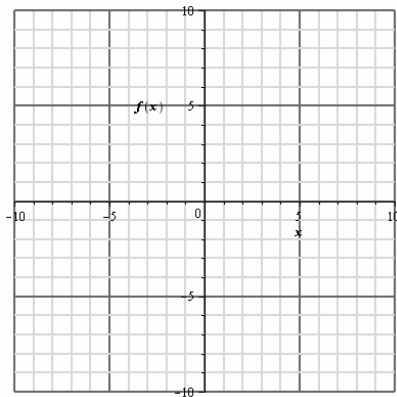Name_____   Class Time_____

Fun with End Behavior and Asymptotes

1. Graph the function $\dfrac{x^4 + 3x^2 - 2}{x^2 - 4}$ in each of the following. Pay attention to the window dimensions.

a. By visual inspection of the first graph, approximate the vertical asymptotes.

b. By visual inspection of the second graph, what degree polynomial function describes the long term behavior of this rational function?

c. Perform long division on the rational function.

$$\frac{x^4 + 3x^2 - 2}{x^2 - 4} =$$

d. What is the polynomial function that describes the long term behavior of the rational function?

e. Graph the polynomial from part (d) and the original rational function on the following axes. How are they similar? How are they different?
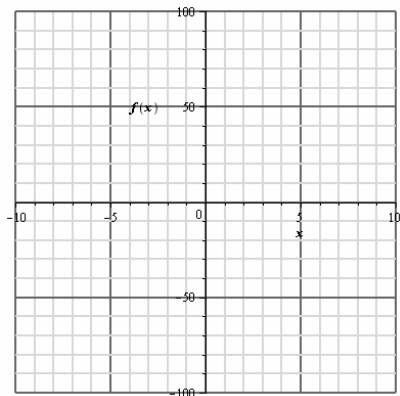
2. Graph the rational function $\dfrac{2x^3 + 4x - 3}{x^2 - 2}$ in your calculator.

   a. By visual inspection of the graph, approximate the vertical asymptotes.

   b. By visual inspection graph, what degree polynomial function describes the long term behavior of this rational function?

   c. Perform long division on the function.

   $$\frac{2x^3 + 4x - 3}{x^2 - 2} =$$

   d. What is the polynomial function that describes the long term behavior of the rational function?

   e. Graph the remainder function and the original rational function on the same window of your calculator. How are they similar? How are they different?

3. Consider the rational function $\dfrac{3x^2 + 4x - 7}{x^2 + 4}$.

   a. Perform long division on the function.

   $$\frac{3x^2 + 4x - 7}{x^2 + 4} =$$

   b. What part of your answer from part (a) describes the long term behavior of the original function?

   c. What part of your answer from (a) describes the vertically asymptotic behavior of the original function?

4. Consider the rational function $\dfrac{3x^2 + 4x - 7}{x^3 + 7}$. Answer the following questions using the same approach as above.

   a. What polynomial function describes the long term behavior of the original function?

   b. What rational function describes the vertically asymptotic behavior of the original function?