

Name: \_\_\_\_\_

Due: 4/9/12

**Problem 1.** (covering Sections 4.1-4.3).

Sketch a careful graph of the function  $h(x) = x^2/(x^2 - 1)$  by completing the following steps. Don't forget to check your final answer on the calculator!

1. Determine the domain of  $h$
2. Find the  $x$ - and  $y$ -intercepts of  $h$ , if possible.
3. Determine the behavior of  $h$  for large absolute values of  $x$ .
4. Find all horizontal and vertical asymptotes of  $h$ .
5. Determine the intervals where  $h$  is increasing and where  $h$  is decreasing.
6. Find the relative extrema of  $h$ .
7. Determine the concavity of  $h$ .
8. Find the inflection points of  $h$ .
9. Plot a few additional points to help further identify the shape of the graph of  $h$ , and sketch the graph.

Remark: steps 1-9 above are taken directly from the the curve-sketching guide in Section 4.3 of the textbook. It is *not* necessary to memorize these steps in order. However, if you are asked to sketch the graph of a function on an exam, you should be able to remember how to find these important features of such a graph in order to provide an accurate depiction.

**Problem 2.** (covering Sections 4.4-4.5).

A travel agency is chartering a flight for a minimum of 200 people. If exactly 200 people sign up for the flight, the fare is set at \$300/person. For each additional person who signs up, beyond the 200th, each passenger's fare is reduced by \$1. Determine how many passengers will result in a maximum revenue for the agency. What is the maximum revenue? What would be the fare per passenger in this case?

Hint: start by explaining why the revenue function  $R$  is given by  $R(x) = (200 + x)(300 - x)$ , where  $x \geq 0$  is the number of passengers over 200.