

## MATH 203 WORKSHEET #6

- (1) A ship uses  $5x^2$  dollars worth of fuel per hour when traveling at  $x$  miles per hour. The other operating expenses amount to \$2000 per hour. What speed minimizes the cost of a 500 mile trip?
- (2) The UH Bookstore sells 8000 copies of Strunk & White each year (or at least it should). It costs \$40 to process each order, and the carrying costs are \$2 per book per year, based on maximum inventory. How many orders should be placed per year, and how many books in each order?
- (3) (Problem taken from “How to Ace Calculus”) You are in a row boat on Lake Erie, 2 miles from a straight shoreline, taking your potential in-laws for a boat ride. Six miles down the shoreline from the nearest point on shore is an outhouse. You suddenly feel the need for its use. Also, the shore line is populated with lots of houses, all owned by people who know your parents. If you can row at 2 mph and run at 6 mph, for what point along the shoreline should you aim in order to minimize the amount of time it will take you to get to the outhouse?
- (4) (Problem taken from “How to Ace Calculus”) You have just invented a new peanut butter guacamole dip, and you open a stand in front of the student union to sell this goop by the jar. Somehow a rumor gets started, certainly not traceable back to you, that it is an aphrodisiac, and sales take off. At a price of \$1.00 a jar, you sell 500 jars a day. For each nickel that you increase the price, you sell two fewer jars. Assuming that your fixed cost per day is \$200 (protection money), and the cost per jar to you is 50 cents, determine the price for which you should sell your dip in order to maximize your profit.
- (5) (Extra Credit) Steve and Arlene are operating a Ponzi scheme in Kailua. After  $t$  weeks of operation, they have  $\frac{500t}{5+t}$  customers, who have paid \$1000 each to invest. Unfortunately, after  $t$  weeks they will have paid out  $\$50t^2$  to investors who want to see some of the promised return. After how many weeks should they skip town? How much bread will they take with them? Where should they go?