Assignment 9

1. A small manufacturer wholesales leather jackets to a number of specialty stores. The monthly demand from these stores for the jackets is described by the demand equation $p = 400 - 50q$. Here p is the wholesale price, in dollars per jacket, and q is the monthly demand, in thousands of jackets. Note that the demand equation makes no sense if $q \geq 8$. The manufacturer's marginal cost is given by the equation

$$dC/dq = \frac{800}{q+5}.$$

    Determine the number of jackets that must be sold per month to maximize monthly profit. You do not need to justify that your answer provides the maximal profit.

2. Find two positive real numbers m and n whose product is 50 and whose sum is as small as possible.

3. You want to build a rectangular pen with three parallel partitions using 500 feet of fencing. What dimensions will maximize the total area of the pen?

4. A container in the shape of a right circular cylinder with no top has a surface area of $3\pi m^2$. What height h and base radius r will maximize the volume of the cylinder?

5. Suppose you own a tour bus and you book groups of 20 to 70 people for a day tour. The cost per person is \$30 minus \$0.25 for every ticket sold. If gas and other miscellaneous costs are \$200, how many tickets should you sell to maximize your profit? Treat the number of tickets as a nonnegative real number.