Assignment 6 for MA 113 - Calculus I (Spring 2010)

March 30, 2010

Instructions: The purpose of this and subsequent assignments is to develop your ability to formulate and communicate a mathematical argument showing step-by-step reasoning.

Please give a complete, well-written solution to each of the following problems. Your work will be graded for accuracy, completeness, and grammatically correct English.

Your solutions should be neat and legible, stapled, and your name should appear on each sheet. Moreover, on page 1 of your solution, please also indicate your *section number* to ensure that you will receive proper credit for the assignment.

Due Date: Your completed solutions are due on **Friday, April 9, 2010**, at the beginning of lecture.

(1) (6 Points) Carry out the following steps to sketch the graph of the function $f(x) = e^{-x}\sin(x)$ on the interval $[0, 2\pi]$.

    (a) Find the critical numbers of f. Compute the local maxima and minima (both coordinates). Give the intervals of increase and decrease.

    (b) Find the inflection points of f. Give the intervals where f is concave upward and where f is concave downward.

    (c) Make a careful sketch of the graph of f that reflects the above information.

(2) (4 Points) Let u and v be two non-negative numbers whose sum is 10. Find the maximum value of $u^4 v$. Determine the values of u and v for which the maximum is attained.

Bonus Problem: (2 Points)

A group of professors in the Math department go out for dinner. They have drinks and food and everything, and their agreement is to share the bill evenly. Just before the bill comes, three of the professors go to the bathroom, manage to climb out the window, and leave for good! The bill comes and it is a whopping $\$120$ (including tax and tip). Professor Lovely says: "Those guys walked out on us again! But look. If everyone, in addition to their original share of the bill, throws in an extra two bucks, we can exactly cover the bill." How many people were in the original group?