Name: _____ **Panther ID:** _____

Mini-Project - MAC2312 Spring 2013 - Instructor: T. Draghici

The goal of this mini-project is to give you some exposure to hyperbolic trig functions and their applications to hanging cables. You should read the first 4-5 pages of section 6.9 and understand Example 4 of this sections. As mentioned in this Example, the general function modeling a hanging cable between two poles is

$$y = a\cosh(\frac{x}{a}) + c, \quad x \in [-b, b],$$

where the parameters a and c depend on the composition of the cable and the height of the poles. The horizontal distance between the poles is $2b$.

1. (10 pts) Use wolframalpha or some other device to get some plots of the above function for some a few values of a and c. About 4 graphs is enough.

2. (20 pts) Solve parts (a) and (b) of Pb. 70, section 6.9 (page 484 in the hard-cover edition of the textbook) for the function

$$y = a\cosh(\frac{x}{a}) + c, \quad x \in [-b, b].$$

(This is basically just the same as for the slightly simpler function $y = a\cosh(\frac{x}{a})$ which is considered in the problem in the textbook.)

3. (10 pts) As a continuation of Pb. 2, show that if the length L and the sag S of the cable are given, then one can find the parameter a of the cable by

$$a = \frac{(L-2S)(L+2S)}{8S}\ .$$

4. (10 pts) Suppose we have to use poles which are 60ft high to suspend a cable of length $L = 120$ft which is known to create a sag of $S = 30$ft. What should be the horizontal distance between the poles?