Math 252 Calculus II (Bueler) Name: _____

Written Homework #6

Due at start of class Monday, 26 February.

This Written Homework has problems from sections 7.8, 8.1, and 8.2. It is also a work sheet to do during the recitation section. Please work on it with other students! The submitted version must be written by you. You must show your work for full credit.

1. Sketch the region and find its area:

$$S = \left\{(x, y) \,\middle|\, -2 < x \le 0,\, 0 \le y \le 1/\sqrt{x+2}\right\}$$

2. Find the exact arclength of the curve:

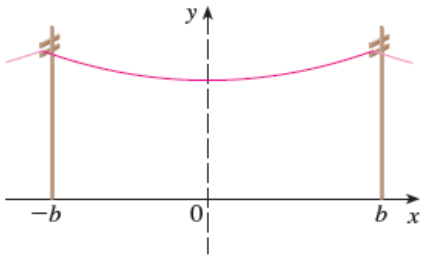
$$y = \ln(\cos x), \quad 0 \le x \le \pi/3$$

3. (a) Set up the integral which computes the arclength.

$y = x \sin x, \quad 0 \leq x \leq \pi$

(b) Use the trapzoid rule with $n = 10$ to estimate the arclength in **(a)**. (*Show enough work to make it clear what you did.*)

4. The figure shows a telephone wire hanging between two poles at $x = -b$ and $x = +b$. It takes the shape of a catenary with equation $y = c + a\cosh(x/a)$. Find the length of the wire.



Hint. Here are the facts about hyperbolic functions which you need for this problem:

$$(\cosh x)' = \sinh x$$
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$$\cosh^2 x - \sinh^2 x = 1$$

5. Find the exact area of the surface obtained by rotating the curve about the x-axis:

$$y = \sqrt{1 + e^x}, \quad 0 \le x \le 1$$