Name _____

Homework 12
Section 3.8

1. (4) Compute $\frac{dy}{dx}$ for $y = \dfrac{\cosh(x^4)}{2}$.

2. (4) Find the derivative of $f(t) = -t^2\left(\sinh^2 t - \cosh^2 t\right)$. Simplify your answer.

3. (4) Find $\frac{dy}{dx}$ for $y = \dfrac{\sinh(x^2)}{x}$.

4. (8) The cable between two towers of an overhead utility cable hangs in the shape of the curve

$$y = \frac{T}{w} \cosh\left(\frac{wx}{T}\right),$$

where T is the tension in the cable at its lowest point and w is the weight of the cable per unit length. Suppose the cable stretches between the points $x = -\frac{T}{w}$ and $x = \frac{T}{w}$. Sketch a graph of the cable. Find an expression for the sag in the cable (the distance between the highest point on the cable and the lowest point on the cable).

Show, *by computing both sides*, that $y'' = \frac{w}{T}\sqrt{1 + (y')^2}$.