Sample Midterm #2, Math 16a, Fall 2010

1. Find the minimum value of $a^2 + 2ab + b^2$ given that $a - b = 2$.

2. Let

$$f(x) = \frac{x^4}{2} - x^2.$$

   Find all x-intercepts, relative extreme points, and points of inflection for $y = f(x)$.

3. Consider the curve defined by the following equation.

$$\frac{x^4}{32} + \frac{y^2}{2} = 1$$

   Find the equations of the tangent lines to this curve at the points on the curve where $x = 2$.

4. Find $\dfrac{dy}{dx}$.

$$y = \frac{e^x - e^{-x}}{e^{3x}}$$

5. A point p is moving along the x-axis at a rate of 10 units/sec. At which location(s) of the point is the distance between it and $(0, -3)$ is increasing at a rate of 5 units/sec?

6. Sketch the graph of $y = (x + 2)^2 e^{-x}$.

7. An open rectangular box with square base is to be made from 48 ft^2 of material. What dimensions will result in a box with the largest possible volume ?