Math 100 - Week 2 Recitation (Fall 2013)

Consider the following functions:

$$f(x) = x^4 - 4x^2 \qquad p(t) = e^{\sin t}$$

$$g(x) = \ln\left(x^{7/8}\right) \qquad q(t) = e^t \sin t$$

$$h(x) = \sqrt{2\cos^2 x + 1} \qquad r(t) = \sin(e^t) + 2$$

1. Determine the derivative of each of the six functions above.

2. Determine $g''(x)$ and $g^{(3)}(x)$.

3. Find each value of x for which $f(x)$ has a local minimum or maximum (and determine which).

4. (a) Determine the slope of the tangent line to the curve $y = h(x)$ at the point $(\pi/4, \sqrt{2})$.
   (b) Determine an equation for the tangent line.

5. If $q(t)$ represents the position (in meters) of a linearly moving object at time t (in seconds). What is the acceleration at time t? What is the velocity at time t?

6. Let $r(t)$ represent the number of liters of acid in a chemical system at time t (measured in minutes). At time $t = \ln(\pi/3)$, is the amount of acid increasing or decreasing? At what rate?

7. Based on the derivatives you found above, is the following antiderivative correct? Explain why or why not.
$$\int \cos(e^t)\, dt = \sin(e^t) + C$$

8. Based on the derivatives you found above, is the following antiderivative correct? Explain why or why not. (Assume $x > 0$.)
$$\int \frac{7}{x}\, dx = 8\ln\left(x^{7/8}\right) + C$$