

## Math 100 - Week 2 Recitation (Fall 2013)

Consider the following functions:

$$f(x) = x^4 - 4x^2$$

$$p(t) = e^{\sin t}$$

$$g(x) = \ln(x^{7/8})$$

$$q(t) = e^t \sin t$$

$$h(x) = \sqrt{2 \cos^2 x + 1}$$

$$r(t) = \sin(e^t) + 2$$

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  $x > 0$ .)

$$\int \frac{7}{x} dx = 8 \ln(x^{7/8}) + C$$