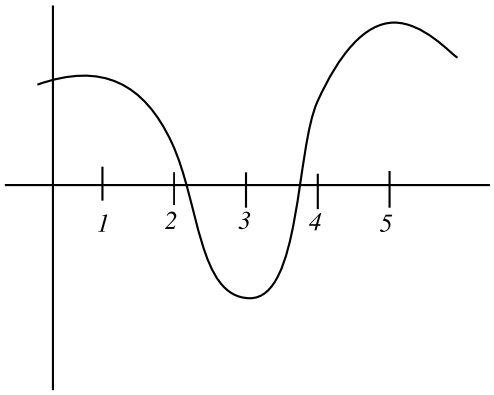
Midterm 2 Practice

WARMUP: Find the derivative of each function. Do not simplify. (At this point in the semester you should be able to do these quickly).

1. $f(x) = 67\pi + 6(5x+4)^8 - 47x$
2. $g(x) = \dfrac{\arcsin(5x^2)}{7}$
3. $h(x) = 8ln(sin(x) + \pi/2)$

PRACTICE EXAM:

1. The graph of a function f(x) is shown below.



   (a) List the intervals of increase and decrease for the function.

   (b) List the intervals where the function is concave up and concave down.

   (c) List the x coordinates of any critical points. Are they maxima or minima?

2. Let $f(x) = x^3 + 2x + 1$. Find $(f^{-1})'(4)$.
   (That is, find the derivative of the inverse function of $f(x)$ evaluated at the point 4. Hint: do not try to find $f^{-1}(x)$ in general.)

3. Consider the function $f(x) = x + \sqrt{x}$. Does this function satisfy the requirements of the mean value theorem on the interval $[0, 4]$? If so, find the x coordinates of all points that satisfy the conclusion of the theorem.

4. A crate with square base and a volume of 15 cubic meters is needed. The material for the bottom costs \$2 per square meter, material for the top costs \$3 per square meter, and material for the sides costs \$1 per square meter. Find the dimensions of the crate that minimize the cost of the materials. What is the minimum material cost?

5. Let $f(x) = sin(x)$.

   (a) Find the linearization of $f(x)$ at $x = \pi/4$.

   (b) Use the linearization to approximate $f(\pi/4 + .01)$. (You do not need to simplify your answer down to a decimal, but it should not have any trig functions in it.)

6. Let $f(x) = (4x)^{sin(x)}$.

   (a) Find $f'(x)$.

   (b) Find the equation of the tangent line to $f(x)$ at $x = \pi$.

COOLDOWN: More derivatives.

1. $h(t) = 4^t \log_4 t$

2. $f(x) = \frac{(x+7)^{3/2}(2x+4)^3}{e^{\tan^{-1}(x)}}$