Discussion Problems for Math 180

Tuesday, March 3, 2015

Review

1. (a) What is the area of a circle with radius r?

   (b) What is the volume of a box with length ℓ, width w, and height h? What is its surface area?

2. Differentiate:

   (a) $e^{2x}\sin(4x)$.

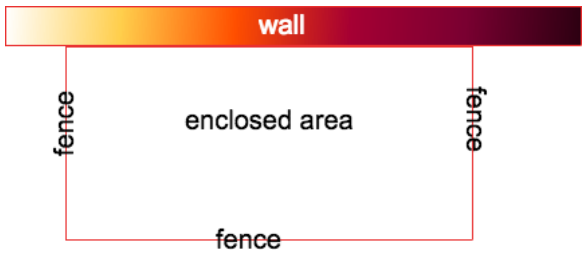
   (b) $\ln(\arctan(x))\arctan(x)$

This time

3. A circle is shrinking in such a way that its radius is decreasing at a constant rate of two inches per second. How fast is the area of the circle decreasing when the circle is one foot across?

4. Sketch the graph of a differentiable function f with domain $(-\infty, \infty)$ which has $f'(x) > 0$ for $-1 < x < 1$ and $f'(x) < 0$ on $(-\infty, -1) \cup (1, \infty)$ and such that $f(2) = 3$.

5. Suppose we have 40 yards of fencing and want to enclose a rectangular area next to a 50-yard-long wall, like so:



   That is, we don't need to put fencing on the side next to the wall. What dimensions should we build the fence with to get the largest possible enclosed area?

6. Determine where the function $x^3 - 3x + 7$ is increasing and decreasing. Use this to determine its maximum and minimum values on the interval $[0, 5]$.

7. For what positive value of x is x^x the smallest?