Math 114 – Homework 1 – due Wednesday, Sept. 7

Problems to complete, write up, and hand in

1. Find $\int \frac{\ln x}{x}\, dx$

2. Find $\frac{d}{dx}\ln(g(x))$ where g is differentiable. Then show how this works out in the following cases: (a) $g(x) = x + 4$, (b) $g(x) = (x + 9)^2$, (c) $g(x) = (x + 4)(x + 9)$ (don't multiply out the product).

3. Textbook, problem 29, section 6.7.

4. Textbook, problem 60, section 6.7.

5. A bit of a challenge (Problem 55, text, Section 6.7) Two points P and Q are chosen randomly, one on each of two adjacent sides of a unit square, situated in the first quadrant with one corner at the origin. What is the probability that the area of triangle formed by the sides points P, Q and the origin has area less than 1/4? Begin by showing that the side lengths from the origin to P and Q which we call x and y must satisfy $xy < \frac{1}{2}$, and that this leads to the answer as $\frac{1}{2} = \int_{\frac{1}{2}}^{1} \frac{1}{2x}\, dx$, which you should evaluate. Write out the reasoning behind this result, not just your answer.

6. Textbook, problem 25, section 6.8.

7. Textbook, problem 39, section 6.8.

You should also practice enough routine problems from these sections so you know you can do them well. Don't hand any in, but feel free to ask about any of them in class.