

PRINT Your Name: \_\_\_\_\_

**Quiz 3 — February 2, 2011 — Section 3 — 8:00-8:50 recitation.**

**Remove everything from your desk except this page and a pencil or pen.**

**Circle** your answer. **Show your work.** **Check** your answer.

The quiz is worth 5 points.

**Find**  $\int (\ln x)^2 dx$ . **Check your answer.**

Try integration by parts:  $\int u dv = uv - \int v du$ . Let  $u = (\ln x)^2$  and  $dv = dx$ . It follows that  $du = 2 \ln x (\frac{1}{x}) dx$  and  $v = x$ . The original integral is

$$x(\ln x)^2 - 2 \int \ln x dx.$$

Use integration by parts again. Let  $u = \ln x$  and  $dv = dx$ . It follows that  $du = (\frac{1}{x}) dx$  and  $v = x$ . The original integral is

$$x(\ln x)^2 - 2(x \ln x - \int dx) = \boxed{x(\ln x)^2 - 2(x \ln x - x) + C}.$$

**Check** . The derivative of the proposed answer is

$$\begin{aligned} x 2 \ln x \left( \frac{1}{x} \right) + (\ln x)^2 - 2 \left( x \left( \frac{1}{x} \right) + \ln x - 1 \right) &= 2 \ln x + (\ln x)^2 - 2(1 + \ln x - 1) \\ &= (\ln x)^2. \checkmark \end{aligned}$$