PRINT Your Name:_____

**Quiz 13 — November 20, 2009 – 9:05 section**

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

Circle your answer. **Show your work.**
The quiz is worth 5 points.

Find the Taylor polynomial of order 4 about $a = 1$ for the function $f(x) = \ln x$.

**Answer:** We know

$$\begin{array}{ll} f(x) = \ln x & f(1) = 0 \\ f'(x) = \frac{1}{x} & f'(1) = 1 \\ f''(x) = \frac{-1}{x^2} & f''(1) = -1 \\ f'''(x) = \frac{2}{x^3} & f'''(1) = 2 \\ f^{(4)}(x) = \frac{-3!}{x^4} & f^{(4)}(1) = -3! \end{array}$$

We know that

$$P_4(x) = f(1) + f'(1)(x-1) + \frac{f''(1)}{2}(x-1)^2 + \frac{f'''(1)}{3!}(x-1)^3 + \frac{f^{(4)}(1)}{4!}(x-1)^4.$$

It follows that

$$\boxed{P_4(x) = (x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} - \frac{(x-1)^4}{4}.}$$