Math 121 Assignment 4 Due Wed. Feb. 5 at start of class

1. Evaluate (substitutions):
   (a) $\int \sec^3 x \tan^3 x dx$.
   (b) $\int \log(\cos x) \tan x dx$.

2. Evaluate (integration by parts):
   (a) $\int (\log x)^2 dx$.
   (b) $\int x \sec x \tan x dx$.

3. Evaluate:
   (a) $\int_0^1 x^5 e^{x^2} dx$.
   (b) $\int \log(\sqrt{1 + x^2}) dx$.
   (c) $\int_0^1 \sqrt{x} \sin(\pi \sqrt{x}) dx$.
   (d) $\int_0^4 \sqrt{x} e^{\sqrt{x}} dx$.

4. Obtain a reduction formula for $I_n = \int \tan^n x dx$ and use it to evaluate $\int \tan^7 x dx$.

5. Find the areas of the following regions:
   (a) The bounded region enclosed by the curve $y^2 = x^6(1 - x^4)$.
   (b) The bounded region bounded by $y = x^4$ and $y = 6 - x^2$.

6. Evaluate:
   (a) $\int \frac{1}{x^2 - 1} dx$.
   (b) $\int \frac{2x}{(x^2 + x + 1)^2} dx$.
   (c) $\int \frac{e^{x} + 1}{x - 1} dx$.

7. Let $f$ be uniformly continuous on $(0, 1)$. Prove $f$ is bounded on $(0, 1)$.

8. Practice questions (not to hand in).
   Sec. 5.7 #15,30; Sec. 6.1 p.339-340. #10, 20, 31, 36