MATH 258 EXAM 2 OCTOBER 10, 2012

NAME:

INSTRUCTIONS: Answer the questions in the space provided. Show all your work: even a correct answer may receive little or no credit if a method of solution is not shown. Solutions for indefinite integrals should be in terms of the original variable and without the composition of trig and inverse trig functions ($\sin(\cos^{-1} x)$ and other such expressions will not earn full credit).

$$\sin^2 u = \frac{1}{2}(1 - \cos 2u) \qquad \cos^2 u = \frac{1}{2}(1 + \cos 2u) \qquad \sin 2u = 2(\sin u \cos u)$$

$$\int \tan u \; du = \ln|\sec u| + C \qquad \int \sec u \; du = \ln|\sec u + \tan u| + C \qquad \int \frac{du}{u^x + a^2} = \frac{1}{a}\tan^{-1}\left(\frac{u}{a}\right) + C$$

1. Evaluate the integral $\int_0^1 x \cos \pi x \; dx$.

2. Evaluate the integral $\int \frac{\ln x}{x^2} \; dx$.

3. Evaluate the integral $\int \sin^3 t \, dt$.

4. Evaluate the integral $\int_0^2 \sqrt{16 - x^2} \, dx$.

5. Evaluate the integral $\displaystyle\int \frac{\sqrt{x^2-1}}{x}\,dx$.

6. Evaluate the integral $\displaystyle\int \frac{4x+1}{x(x+1)^2}\,dx$.

7. Determine if the improper integral converges or diverges. If it converges evaluate it. $\displaystyle\int_0^1 \frac{e^{\frac{1}{x}}}{x^2}\,dx.$

8. Use the comparison theorem to determine if the improper integral converges or diverges. Be very clear about the comparison you are using. Do not evaluate the integral. $\displaystyle\int_1^\infty \frac{dx}{\sqrt{x^3+1}}.$