

MATH 186: Calculus II

Homework Set 5

Fall 2012

Name: _____

Points: _____ /100

Each problem is worth 10 points and correct or partially correct responses will count toward your total grade. You are encouraged to work with other students in the class, but your final write-up should be in your own words and based on your own understanding. Your work should be done on standard size typing paper (ruled or not ruled, no spiral notebook pages) and attached to this page.

1. Find the values of p for which the integral

$$\int_e^{\infty} \frac{1}{x \cdot (\ln x)^p} dx$$

converges and evaluate the integral for those values of p .

2. Determine whether the integral

$$\int_0^1 \ln x dx$$

is convergent or divergent. Evaluate the integral if it is convergent, if not, explain why it is divergent.

3. Determine whether the integral

$$\int_0^{10} \frac{(\ln x)^2}{x} dx$$

is convergent or divergent. Evaluate the integral if it is convergent, if not, explain why it is divergent.

4. Determine whether the integral

$$\int_0^{\pi} \sec x dx$$

is convergent or divergent. Evaluate the integral if it is convergent, if not, explain why it is divergent. It would help to familiarize yourself with the graph of $\sec x$.

5. Use an integral comparison with a simpler integral to determine whether the integral

$$\int_0^1 \frac{dx}{\sqrt{1-x^3}}$$

converges or diverges. You do not need to evaluate the integral, but explain your reasoning.

6. Use an integral comparison with a simpler integral to determine whether the integral

$$\int_1^{\infty} \frac{\ln x}{x^2} dx$$

converges or diverges. You do not need to evaluate the integral, but explain your reasoning.

7. Use an integral comparison with a simpler integral to determine whether the integral

$$\int_0^1 \frac{e^{-x}}{\sqrt{x}} dx$$

converges or diverges. You do not need to evaluate the integral, but explain your reasoning.

8. For what values of a is

$$\int_0^{\infty} e^{ax} \cos x dx$$

convergent? You do not need to evaluate the integral, but explain your reasoning.

9. The integral

$$\int_0^{\infty} \frac{e^{-x}}{x} dx$$

is improper at both ends. Determine whether the integral is convergent or divergent, and if it is convergent evaluate the integral.

10. Find the value of the constant C for which the integral

$$\int_0^{\infty} \left(\frac{x}{x^2 + 1} - \frac{C}{3x + 1} \right) dx$$

converges. Evaluate the integral for this value of C .