

**MthU242**  
**Northeastern University**  
**Hour Exam**  
**65 Minutes**

**Calculus II**  
**Professor Gilmore**  
**Mar. 1, 2007**

**Name:** \_\_\_\_\_.

**Show All Your Work**

1. Calculate the following integrals:

a. (6 points)  $\int \frac{\sin(\sqrt{x-1})dx}{\sqrt{(x-1)}}$

b. (6 points)  $\int \frac{dx}{x \ln(x)}$

c. (6 points)  $\int_0^5 \frac{3dx}{\sqrt{1-4x^2}}$

2. Find the integrals:

a. (6 points)  $\int 3x \cos(2x)dx$

b. (6 points)  $\int \tan^{-1}(x) dx$

3. (10 points) Use the Trapezoidal Rule with four intervals to estimate the value of the integral  $\int_3^4 \frac{\cos(x)}{x} dx$

4. (10 points) Find the bounded area between the curves  $y = 5 - (x - 2)^2$  and  $y = 5 - x$

5. (12 points) The region enclosed by the curve  $y = \sin(x)$  and the line  $y = 0$ , for  $0 \leq x \leq \pi$  is rotated about the y-axis. Use an integral to find the volume generated.

6. (10 points) Evaluate the integral  $\int_1^{\infty} \frac{7dx}{\sqrt[3]{x^2}}$ . If it diverges, explain why this happens. If it converges, explain why it does and give the number to which it converges.

7. Explain why the following infinite series converge or diverge:

a. (10 points)  $\sum_{n=1}^{\infty} \frac{10,000 + 396n^3}{10n^5}$

b. (10 points)  $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

8. (8 points) Does the following infinite series converge or diverge, and why? If it converges, calculate the number

$$\frac{16}{27} - \frac{64}{81} + \frac{256}{243} - \frac{1024}{729} + \cdots + \frac{(-1)^n \cdot 4^{n+2}}{3^{n+3}} + \cdots$$

Name:\_\_\_\_\_.