

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) $\int \frac{5x dx}{\sqrt{(x^2 - 1)}}$

b. (6 points) $\int \frac{3x^2 dx}{x^3 + 23}$

c. (6 points) $\int_0^1 \frac{4 dx}{1 + x^2}$

2. Find the integrals:

a. (6 points) $\int 11xe^{3x} dx$

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

3. (10 points) Use Simpson's Rule with four intervals to estimate the value of the integral $\int_1^2 \frac{\sin(x)}{x} dx$

4. (10 points) Find the bounded area between the curves $y = 1 + x^3$ and $y = \frac{3 + x}{3}$

5. (12 points) The region enclosed by the curve $y = 1 - (x - 1)^2$ and the line $y = x$, for $x \geq 0$ is rotated about the y-axis. Use an integral to find the volume generated.

6. (10 points) Evaluate the integral $\int_0^1 \frac{7dx}{\sqrt[2]{x^3}}$. 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) $\sum_{n=1}^{\infty} \frac{.0001 + .001n^3}{10^6 n^4}$

b. (10 points) $\sum_{n=1}^{\infty} \frac{47,000}{3n^3 + 2}$

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

$$\frac{9}{25} - \frac{9}{125} + \frac{9}{625} - \frac{9}{3125} + \cdots + \frac{(-1)^n \cdot 9}{5^{n+2}} + \cdots$$

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