

MthU242
Northeastern University
Hour Exam
65 Minutes

Science and Engineering Calculus II
Professor Gilmore
Feb. 28, 2008

Name: _____.

Show All Your Work, Use calculators for emotional support only.

1. Evaluate the following integrals:

a. (7 points) $\int \frac{x^2 dx}{\sqrt{(37 + x^3)}}$

b. (7 points) $\int \frac{\cos x}{\sin x} dx$

c. (7 points) $\int_0^{\frac{1}{2}} \frac{xdx}{\sqrt{1 - 16x^4}}$

2. Find the integrals:

a. (7 points) $\int 2x \cdot \sin x \cdot dx$

b. (7 points) $\int \ln x dx$

3. (7 points) Use Simpson's rule with 6 intervals to estimate the value of the integral $\int_0^1 e^{x^2} dx$

4. (10 points) Find the finite area between the curves $y = 35 - x$ and $y = x^2 + x$.
If you use a calculator to do part of this problem, show your work. Do not use a calculator to do the integration. Draw a picture of the two curves.

5. (10 points) Evaluate the integral $\int_0^1 \frac{3dx}{\sqrt[3]{x^2}}$ carefully. If it diverges, explain why this happens. If it converges, give the number to which it converges, and explain why this is so.

6. (10 points) The region between the curve $y = 1 - (2 - x)^2$ and the x-axis is rotated about the y-axis. Find the volume generated. Draw a picture of the region.

7. Do the following infinite series converge or diverge? Give reasons.

a. (7 points) $\sum_{n=1}^{\infty} \frac{(-1)^n \cdot 32}{(.5) \cdot n}$

c. (7 points) $\frac{7}{36} + \frac{7}{216} + \frac{7}{1296} + \frac{7}{7776} + \cdots + \frac{7}{6^{n+2}} + \cdots$

8. Explain why the following infinite series converge or diverge.

a. (7 points) $\sum_{n=1}^{\infty} \frac{\sqrt{3}}{n^3 + 17}$

b. (7 points) $\sum \frac{0.000001 + 0.00032n^2}{20^5 n^2 + \sqrt{6,250,000}}$