

Name _____ Instructor _____ Your class time _____

MATH 104 - MIDTERM EXAM
Thursday March 13, 2003, 7:30PM-9:00PM
McDonnell A02

This examination booklet contains 9 problems on 10 sheets of paper including the front cover. Do all of your work in this booklet and show all your computations. This is a closed book exam.

Calculators are NOT allowed. This exam was designed so that all problems could be solved without heavy computations.

Problem	Possible score	Your score
1	12	
2	12	
3	12	
4	12	
5	12	
6	12	
7	12	
8	6	
9	10	
Total	100	

WRITE OUT AND SIGN PLEDGE:

I pledge my honor that I have not violated the Honor Code during this examination.

GRADES CAN BE OBTAINED ON THE WEB, AT THE BLACKBOARD WEB SITE FOR THE COURSE.

1. (12 points) Find $\int \frac{\sin^3(\ln x) \cos^2(\ln x)}{x} dx$.

2. (12 points) Find $\int \frac{\ln(x^2 + x + 1)}{x^2} dx$.

3. (12 points) Find $\int e^{3x} \arctan(e^x) dx$.

4. (12 points) Find $\int_0^2 \frac{dx}{\sqrt{x^2 + 4x}}.$

5. (12 points) Find $\int \sin^2 \theta \cos 3\theta d\theta$.

6. (12 points) Set up an integral for the area of the region enclosed between the curve $y = x^3 - 2$ and its tangent line at $x = -1$. **JUST SET UP THE INTEGRAL. DO NOT COMPUTE A NUMERICAL VALUE.**

7. (12 points) The region R is bounded by the curves $y = \ln x$, $y = 0$ and $x = e$. The solid S is obtained by revolving R around the y -axis.

- (a) Set up an integral for the volume of S using the shell method.
- (b) Set up an integral for the volume of S using the disk or washer method.
- (c) Compute the volume of S .

8. (6 points) Sketch the curve given in polar coordinates by $r = 1 + \sin \theta$.

9. (10 points) Find the length of the curve $y = \frac{e^x + e^{-x}}{2}$ as x runs from 0 to 1.