

January 30, 2003

Name (Please Print) _____

Math 125 C, D—First Midterm Exam—Winter 2003

Your T.A. _____

Your Signature _____

Quiz Section

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Student I.D.#

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This is a *limited open note* exam. You may use one page of notes that are *in your own handwriting*. You may *not* use books, printed matter, etc.

You may *not* use graphing or programmable calculators. You may use a “scientific calculator” (capable of doing trig functions, exponentials, and logarithms).

There are 5 problems. Each problem is worth 10 points, for a total of 50 points. Show all of your work. Partial credit will be given for partial solutions. Correct answers with insufficient or incorrect work will *not* get much credit.

Please note: Give all answers as EXACT answers (like $\pi/6$ or $1 + \sqrt{2}$) unless you are explicitly given directions otherwise.

Score

1.	(10)	
2.	(10)	
3.	(10)	
4.	(10)	
5.	(10)	
Total	(50)	
Exam Grade		

1. A particle is moving along a straight line with acceleration $a(t) = -2 \sin(t)$. At time $t = 0$, its velocity is $v_0 = 1$.

(a) (5 points) Find the velocity $v(t)$ of the particle as a function of time t .

(b) (5 points) What is the *total distance* travelled by the particle from time $t = 0$ to time $t = \pi$?

2. (a) (5 points) Find the indefinite integral $\int x e^{x^2} \sec^2(e^{x^2}) dx$.

(b) (5 points) Evaluate the definite integral $\int_1^{\sqrt{e}} \frac{\cos(\pi \ln x)}{x} dx$.

3. Consider the region in the xy -plane enclosed between the curves $y = 2\sqrt{x}$ and $y = x$.

(a) (6 points) Find the area of this region.

(b) (4 points) Express the volume of the solid of revolution obtained when this region is rotated around the vertical line $x = -1$ in terms of a definite integral with respect to x .
DO NOT EVALUATE THE INTEGRAL.

4. Consider the region in the xy -plane between the lines $x = 0$ and $x = 1$, above the x -axis, and below the curve $y = \sqrt{\sin^{-1}(x)}$.

(a) (4 points) Express the volume of the solid of revolution obtained when this region is rotated around the x -axis in terms of a definite integral with respect to x .

DO NOT EVALUATE THE INTEGRAL.

(b) (6 points) Express the volume of the solid of revolution obtained when this region is rotated around the x -axis in terms of a definite integral with respect to y , and evaluate that integral.

5. A rocket is taking off, going straight up. At time t , its height $s(t)$ is given by the formula

$$s(t) = \int_0^{\pi t} \sqrt{4 \sin^2 x + 1} \, dx.$$

(a) (5 points) Estimate the height $s(1/2)$ of the rocket at time $t = 1/2$ by using a right-hand Riemann sum with $n = 3$ equal subintervals.

(b) (5 points) Find the velocity $v(t)$ of the rocket as a function of time t .