University of Washington **Department of Mathematics**
Midterm Exam #1 **Math 125E** **January 29, 2003**

You are: _____ _____ _____
Name Section Student #

Problem	Total Points	Score
1	12	
2	8	
3	8	
4	8	
5	14	
Total	50	

Instructions

1. Print your **Name, Section** (EA, EB or EC) and **Student #** on this page.
   Do **NOT** separate the pages of the exam.
2. Check to see that your copy of the exam has 6 pages.
3. **SHOW ALL OF YOUR WORK.** Partial credit will only be given where you have made it clear that you understand part of the solution. Answers without justification may not receive full credit. The correct answer may receive no credit if you do not show how you arrived at that answer.
4. You are allowed use of 1 page of handwritten notes. If you need more space to solve a problem, use the back of the page preceding that problem.
5. Read each question carefully. Work the problems in an order that will maximize your score. Be clear and concise. **Good luck!**

1. (12 points) Evaluate the following integrals. Show all of your work and simplify your answer as much as possible.

(a) (4 points)

$$\int_0^{\pi/2} \frac{\cos x}{\sqrt{1-\sin x}}\, dx$$

(b) (4 points)

$$\int \frac{5xe^{x^2}}{e^{x^2}-5}\, dx$$

(c) (4 points)

$$\int \tan x \ln(\cos x)\, dx$$

2. (8 points) Find the derivative of the function

$$g(x) = \int_1^{\cos x} \sqrt[3]{1 - t^2}\, dt.$$

3. (8 points) A particle moves along a line with velocity function

$$v(t) = t^2 - t.$$

(a) (4 points) Find the displacement of the particle during the time interval $[0, 5]$.

(a) (4 points) Find the distance traveled by the particle during the time interval $[0, 5]$.

4. (8 points) Find a number b such that the line $y = b$ divides the region bounded by the curves

$$y = x^2 \qquad \text{and} \qquad y = 4$$

into two regions with equal area.

5. (14 points) Consider the region R bounded by the curves

$$y = \frac{1}{2}\sqrt{x}, \qquad y = 1 \qquad \text{and} \quad \text{the} \qquad y - \text{axis}.$$

(a) (5 points) Find the area of R.

(b) (5 points) Find the volume, V, of the solid obtained by rotating R about the x-axis.

(c) (4 points) Set up an integral for the volume of the solid obtained by rotating the region R about the line $x = 5$. DO NOT EVALUATE THE INTEGRAL.