

Math 125 E (Einsiedler)  
23 October 2003  
Midterm #2 (50 points)

Name \_\_\_\_\_

TA: \_\_\_\_\_

Section: \_\_\_\_\_

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Instructions:

- Your exam contains 5 problems. The entire exam is worth 50 points. The point value of each problem is clearly marked.
- Your exam should contain 6 pages; please make sure you have a complete exam.
- Box in your final answer when appropriate.
- Be precise in your statements – Equal signs and ‘such’ fulfill a purpose.
- When appropriate, carry out calculations to at least two decimal places.
- Unless stated otherwise, you **MUST** show work for credit. No credit for answers only. No graphing calculators are allowed. One page of notes, handwritten on both sides are allowed. If in doubt, ask for clarification.
- Read the questions carefully, misreading a word might change the meaning of the problem. Make sure to do your own work on the exam.

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Problem #1 (10pts) \_\_\_\_\_

Problem #2 (10pts) \_\_\_\_\_

Problem #3 (10pts) \_\_\_\_\_

Problem #4 (8pts) \_\_\_\_\_

Problem #5 (12pts) \_\_\_\_\_

TOTAL (50pts) \_\_\_\_\_

1. Compute the following integrals. Give your answer in exact form and evaluate functions if this is possible without your calculator.

(a) (5pts)

$$\int_1^2 \left( \frac{z^2}{\sqrt{z}} - z^{-1} \right) dz$$

(b) (5pts)

$$\int_0^{\pi/2} \sin 2x \, dx$$

2. Compute the following integrals.

(a) (5pts)

$$\int \frac{\arctan x}{x^2 + 1} dx$$

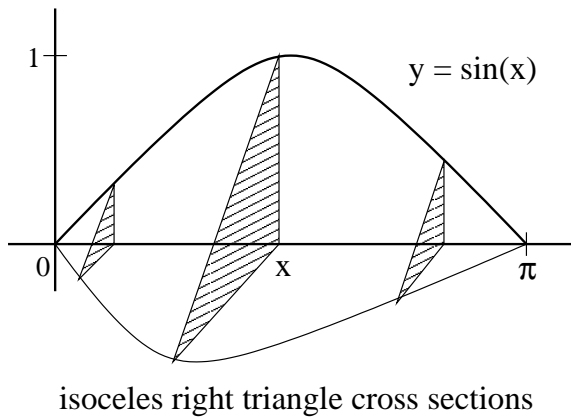
(b) (5pts)

$$\int x \sqrt[3]{x+2} dx$$

3. (10pts) For each of the following, set up the definite integral that represents the volume described in the problem. **Do not simplify or evaluate the integrals.**

(a) (6pts) Let  $R$  be the region bounded between  $f(x) = 4x - x^2$  and  $g(x) = x$ . The region  $R$  is rotated about the vertical line  $x = 5$  to form a solid of revolution.

(b) (4pts)  $T$  is a solid between  $x = 0$  and  $x = \pi$ . Each cross section of  $T$  in the plane through  $x$  and perpendicular to the  $x$ -axis is an isosceles right triangle whose base equals its height (see the figure).



4. (8pts) Use the midpoint rule with  $n = 4$  to approximate (numerically) the area bounded above by  $y = 1 + \sin x$  and below by  $y = -\sqrt{x + x^2}$  between  $x = 0$  and  $x = 2$ . Also write down the Riemann sum you are evaluating (without the  $\Sigma$ -notation).

5. Pete is driving his car along a straight street. He starts at his work place and needs to deliver a packet to a customer. Not knowing the neighborhood too well he starts going in the wrong direction, but realizes his mistake soon. The velocity of his car is given by  $v(t) = 90t^2 - 50t$  in mi/hour where  $t$  is measured in hours.

(a) (6pts) Pete reaches his destination after one hour. How far away does the customer live from Pete's work place?

(b) (6pts) Pete's car is quite friendly to the environment, it can drive 35 miles per gallon fuel. How much fuel did Pete use up for this journey?