

Math 125 E (Einsiedler)
20 November 2003
Midterm #2 (50 points)

Name _____

TA: _____

Section: _____

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 5 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.

Problem #1 (10pts) _____

Problem #2 (15pts) _____

Problem #3 (9pts) _____

Problem #4 (6pts) _____

Problem #5 (10pts) _____

TOTAL (50pts) _____

1. (10pts) Compute the following integral. Give your answer in exact form.

$$\int_2^{\sqrt{8}} \frac{dx}{x^4 \sqrt{x^2 - 4}}$$

2. Compute the following integrals.

(a) (9pts)

$$\int \frac{e^{3x}}{e^{2x} - 1} dx$$

(b) (6pts)

$$\int x \ln x dx$$

3. (9pts) A spring has a natural length of 20cm. If a 25N force is required to keep it stretched to a length of 30cm, how much work is required to stretch it from 20cm to 25cm ? (Recall that by Hooke's law the force required to maintain a spring stretched x units beyond its natural length is given by $f(x) = kx$ for some positive constant k .)

4. (6pts) Set up the integral but do not calculate the integral which gives the arc length of the curve $y = \arcsin x$ between $x = 0$ and $x = \frac{1}{2}$.

5. (10pts) Decide whether

$$\int_0^1 \ln x \, dx$$

is a convergent or divergent improper integral. In the case of convergence calculate the integral.