

First Name _____ Last Name _____

CALCULUS IA - FINAL EXAM
MAY 10, 2000

This examination contains (8) problems on (10) sheets of paper including the front cover and the extra sheet on the back. Do all of your work on the sheets, and show all your computations. This is a closed book exam. The use of calculators is not permitted. Exam time is (2) hours.

Problem	Score
1	
2	
3	
4	
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6	
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8	
Total	

1. (25 pts) Find the limit.

$$\lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x-1} \right).$$

2. (25 pts) Find an equation of the tangent line to the curve

$$\sqrt{x} + \sqrt{y} = 3 \quad \text{at} \quad (4, 1).$$

3. (25 pts) The graph of a function f is shown.
- (a) On what intervals f is continuous?
 - (b) On what intervals f is differentiable?
 - (c) On what intervals f' is positive? On what intervals f' is negative?
 - (d) On what intervals f'' is positive? On what intervals f'' is negative?

4. (25 pts) Find the local and absolute extreme values of the function

$$f(x) = x - 2 \cos x, \quad -\pi \leq x \leq \pi.$$

5. (25 pts) Evaluate the integral

$$\int_0^4 \frac{x}{\sqrt{1+2x}} dx.$$

6. (25 pts) Evaluate the integral

$$\int \frac{\sin x}{1 + \cos^2 x} dx.$$

7. (25 pts) Find the area of the region bounded by the curves

$$y = \sin(\pi x), \quad y = x^2 - x, \quad x = 2.$$

8. (25 pts) Find the volume of the solid obtained by rotating the region bounded by the curves

$$y = x^2 - 3x + 2, \quad y = 0$$

about the y -axis.