

Mathematics 1A, Section 2
Sarason

November 2, 2001

MIDTERM EXAMINATION

Name (Printed): _____

Signature: _____

SID Number: _____

GSI's Name: _____

Section Time: _____

1	5	
2	29	
3	20	
4	20	
TOTAL	74	
GRADE		
POINTS		

Closed Book. No Calculators.

Put your name on every page.

SHOW YOUR WORK. Cross out anything you have written that you do not want the grader to consider.

The points for each problem are in parentheses. Perfect score = 80.

1. (10) Evaluate the limits. State clearly what method you are using.

(a) $\lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{\ln x}$

(b) $\lim_{x \rightarrow \infty} [e^{(x+e^{-x})} - e^x]$

Name _____

2. (30) For the function $f(x) = x^3 - x^2$:

- (a) determine the intervals of increase and decrease, and the local maxima and minima;
- (b) determine the intervals of upward and downward concavity, and the inflection points;
- (c) sketch the graph.

Name _____

3. (20) What is the maximum possible area of a rectangle in the first quadrant having one vertex at the origin and the opposite vertex on the ellipse $4x^2 + 9y^2 = 1$?

Name _____

4. (20) A $\frac{1}{2}$ -mile-long freight train is traveling east at 50 miles per hour on a straight level track. A cow watches from a spot $\frac{1}{4}$ mile south of the track. At what rate is the distance between the cow and the train's engine increasing when the train's caboose is due north of the cow? (FYI: The caboose is the last car of the train.)