MATH 1B, Lecture 3
Sarason

February 15, 1996

MIDTERM EXAMINATION

Name (printed)____________________

Signature____________________

TA____________________

Section time____________________

1	
2	
3	
4	
5	
6	
Total	
Grade points	

Closed book. No calculators

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 = 70

TABLE OF INTEGRATION FORMULAS

Constants of integration have been omitted.

1. $\int x^n\,dx = \frac{x^{n+1}}{n+1} \quad (n \neq -1)$

2. $\int \frac{1}{x}\,dx = \ln|x|$

3. $\int e^x\,dx = e^x$

4. $\int a^x\,dx = \frac{a^x}{\ln a}$

5. $\int \sin x\,dx = -\cos x$

6. $\int \cos x\,dx = \sin x$

7. $\int \sec^2 x\,dx = \tan x$

8. $\int \csc^2 x\,dx = -\cot x$

9. $\int \sec x \tan x\,dx = \sec x$

10. $\int \csc x \cot x\,dx = -\csc x$

11. $\int \sec x\,dx = \ln|\sec x + \tan x|$

12. $\int \csc x\,dx = \ln|\csc x - \cot x|$

13. $\int \tan x\,dx = \ln|\sec x|$

14. $\int \cot x\,dx = \ln|\sin x|$

15. $\int \sinh x\,dx = \cosh x$

16. $\int \cosh x\,dx = \sinh x$

17. $\int \frac{dx}{x^2 + a^2} = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right)$

18. $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right)$

*19. $\int \frac{dx}{x^2 - a^2} = \frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right|$

*20. $\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln|x + \sqrt{x^2 \pm a^2}|$

Name______________________________

1. (10) Perform the integration: $\int x^{-2} \ln x \, dx$

2. (10) Perform the integration: $\int (x^2+6x+5)^{-3/2} \, dx$

Name________________________

3. (10) Perform the integration: $\int \frac{x^2-3x+3}{(x-2)^3}\,dx$

Name______________________________

4. (10) Perform the integration: $\int \frac{1}{e^x(e^{2x}+1)}\,dx$

Name______________________________

5. (15) Use the comparison test to prove that one of the following improper integrals converges and one diverges. Explain your reasoning.

(a) $\int_1^\infty (x^4-1)^{-1/4}\,dx$ (b) $\int_0^{\pi/2} \left(\frac{\cos x}{x}\right)^{1/4} dx$

Name______________________________

6. (15) Find the arc length of the portion of the graph of the function $f(x) = 2 \sec x$ lying above the interval $[0, \pi/4]$.