

Mathematics 16B
Sarason

November 9, 2005

MIDTERM EXAMINATION 2

Name (Printed): _____

Signature: _____

SID Number: _____

GSI (check one): Matthew Gagliardi
 Jon Harel
 James Kelley

1	
2	
3	
4	
TOTAL	
GRADE	
POINTS	

Section Number or Time: _____

Put your name on every page.

Closed book except for crib sheet. No calculators.

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

The points for each problem are in parentheses. Perfect score = 65.

For possible use in Question 4

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}, \quad \cos \frac{\pi}{3} = \frac{1}{2}$$

Name _____

2

1. (20) Evaluate the integrals.

$$(a) I_1 = \int_{-\pi/2}^{\pi/2} \sin^2 x \cos x \, dx \quad (b) I_2 = \int_1^2 \frac{\ln x}{x^4} \, dx$$

Name _____

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2. (20) (a) Find the general solution of the differential equation $y' = t^2(y - 1)^2$.
(b) Find the solution satisfying the initial condition $y(0) = 0$.
(c) Find the solution satisfying the initial condition $y(0) = 1$.

Name _____

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3. (15) (a) Find the general solution of the differential equation $y' = .1y - 2,000$.
(b) Find the solution satisfying the initial condition $y(0) = 10,000$.

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4. (10) A rocket is launched from launching pad A and ascends vertically, its altitude t minutes after blastoff being given by the function $h(t)$. Denote by $C = C(t)$ the location of the rocket at time t . An observer at observation station B , one mile from A , measures the angle of elevation $\theta(t)$ of the rocket at time t . ($\theta(t)$ is the angle in radians at the vertex B of the right triangle ABC .) The measurements produce the values $\theta(1) = \pi/3$ radians and $\theta'(1) = 5/2$ radians per minute. What is the speed of the rocket one minute after blastoff?