

Name: \_\_\_\_\_ Section Number: \_\_\_\_\_

TA Name: \_\_\_\_\_ Section Time: \_\_\_\_\_

**Math 20B.**  
**Midterm Exam 1**  
**January 26, 2005**

*Turn off and put away your cell phone.*

*No calculators or any other electronic devices are allowed on this exam.*

*You may use one page of notes, but no books or other assistance on this exam.*

*Read each question carefully, answer each question completely, and show all of your work.*

*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

*If any question is not clear, ask for clarification.*

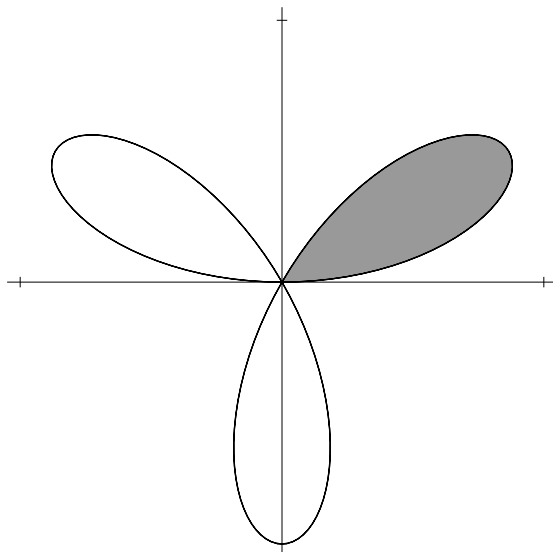
1. (4 points) Evaluate the following integrals.

(a)  $\int x \sin(3x^2) dx$

(b)  $\int_{e^3}^{e^4} \frac{dx}{x(\ln x)^2}$

#	Score
1	
2	
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$\Sigma$	

2. (4 points) Find the area enclosed by one loop of the polar curve  $r = 5 \sin(3\theta)$ .



3. A vehicle travels along a line so that its velocity at time  $t$  is  $v(t) = 9 - t^2$  meters per second.
- (a) (2 points) Find the displacement (net distance traveled) of the vehicle from  $t = 0$  to  $t = 4$  seconds.

(b) (4 points) Find the total distance traveled by the vehicle from  $t = 0$  to  $t = 4$  seconds.

4. (4 points) Find the fourth roots of  $-81$  and express them in polar form. (Note that  $81 = 3^4$ .)

5. (4 points) A spherical water tank of radius  $A$  feet is filled to a depth  $D$  feet. Find the volume of water in the tank.

