

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

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

**Math 20B.**  
**Midterm Exam 1**  
**January 28, 2004**

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

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

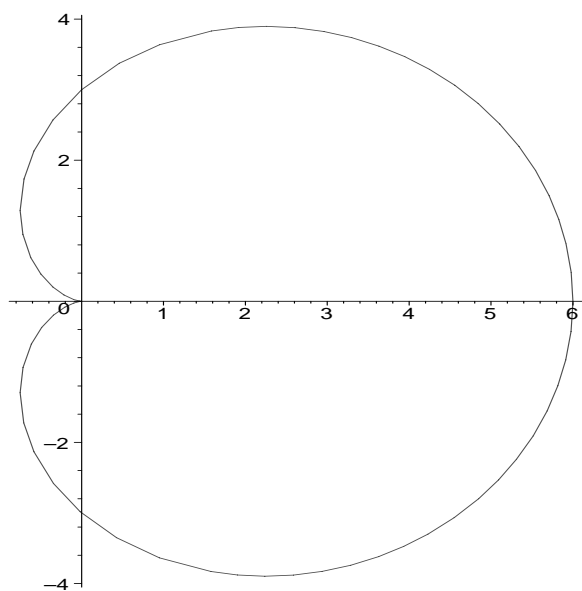
*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

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

1. (4 points) Find the area of the region bounded by the graphs of  $y = x^2$  and  $y = 2x^2 + 3x$ .

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2. (4 points) Find the area enclosed by the polar curve  $r = 3(1 + \cos \theta)$ .



3. A vehicle travels along a line so that its velocity at time  $t$  is  $v(t) = 2t - 4$  feet 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 cube roots of  $27i$  and express them in polar form.

5. Evaluate the following integrals.

(a) (4 points)  $\int 5x \sin(x^2) dx$

(b) (4 points)  $\int_1^2 x^2 \sqrt{x-1} dx$

6. (4 points) A spherical water tank of radius  $r$  feet is filled to a depth  $h$  feet. Find the volume of water in the tank.

