

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

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

**Math 20B.**  
**Midterm Exam 1**  
**February 1, 2006**

*Turn off and put away your cell phone.*

*No calculators or any other 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. (6 points) Evaluate the following integrals.

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

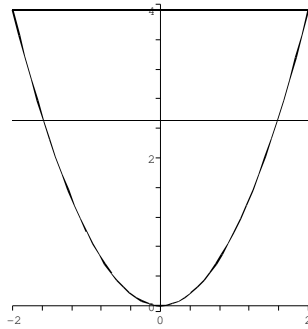
(b)  $\int_2^3 x^2 \sqrt{x-2} dx$

#	Score
1	
2	
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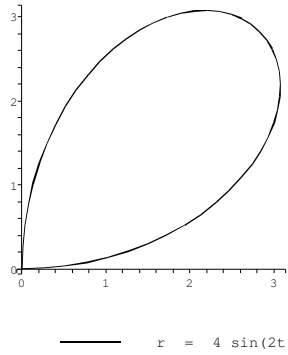
2. (8 points) Let  $\mathcal{R}$  be the region enclosed by the curves  $y = x^2$  and  $y = 4$ .

(a) Find the area of the region  $\mathcal{R}$ .

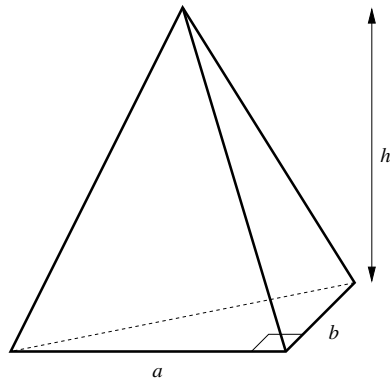
(b) Find the number  $b$  such that the line  $y = b$  divides the region  $\mathcal{R}$  in part (a) into two regions with equal area. [Hint: Try integrating with respect to  $y$  rather than  $x$ .]



3. (6 points) Find the area enclosed by one loop of the polar curve  $r = 4 \sin(2\theta)$ .



4. (6 points) Find the volume of a tetrahedron with height  $h$  and with a right triangular base with side lengths  $a$  and  $b$ . [Note: A tetrahedron is a pyramid with a triangular base.]



5. (8 points) Let  $z = 1 + \sqrt{3}i$ .

(a) Write  $z$  in polar form.

(b) Find  $z^{10}$  and write it in standard  $(a + bi)$  form.