

Math 125 - Fall 2009

Exam 1

October 22, 2009

Name: _____

Section: _____

Student ID Number: _____

1	12	
2	5	
3	10	
4	5	
5	9	
6	10	
7	9	
Total	60	

- You are allowed to use a scientific calculator (**no graphing calculators**) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
- Check that your exam contains all the problems listed above.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit. **Put a box around your FINAL ANSWER for each problem and cross out any work that you don't want to be graded.** Give exact answers wherever possible.
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Any student found engaging in academic misconduct will receive a score of 0 on this exam.
- You have 80 minutes to complete the exam. Budget your time wisely.
SPEND NO MORE THAN 15 MINUTES PER PAGE!

GOOD LUCK!

1. (12 points)

(a) Evaluate $\int_1^4 (5\sqrt{x} + 2)x \, dx$

(b) Evaluate $\int \frac{x^5}{1+x^3} \, dx$

(c) Evaluate $\int \sin(x) \sec(\cos(x)) \tan(\cos(x)) + 3e^x \, dx$

2. (5 pts) Define $A(x) = \int_1^{x^2} \frac{t-4}{t+7} dt$.

Give all values of x for which the derivative of $A(x)$ equal to zero. (That is, solve $A'(x) = 0$).

3. (10 pts) A particle is moving along a straight line with acceleration $a(t) = 2t - 4$ feet/sec². At time $t = 2$ seconds, the velocity is $v(2) = -9$ feet/sec.

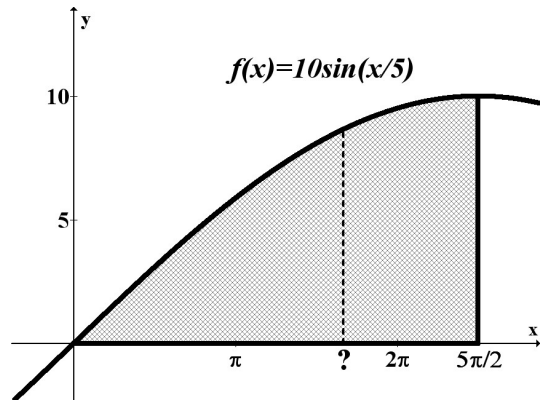
(a) (4 pts) Find the velocity function, $v(t)$, at time t seconds.

(b) (6 pts) Find the **total distance** traveled by the particle from $t = 0$ to $t = 10$ seconds.

4. (5 pts) Estimate the area under $y = x \ln(x)$ from $x = 1$ to $x = 7$ with $n = 3$ subintervals and using the **midpoint** rule. (Show your work and give your final answer to 4 digits after the decimal point)

5. (9 pts) The floor plan of your modern living room is in the shape of the region bounded by $y = 10 \sin(x/5)$, $y = 0$ and $x = \frac{5\pi}{2}$ that is illustrated here (all units are in yards).

(a) (4pts) How many square yards of carpet is needed to cover the entire living room? (That is, what is the area of your entire living room).



(b) (5 pts) You decide to carpet only the left half of your living room. Where should you divide the region with a vertical line so that each side has exactly the same area? (see the picture)

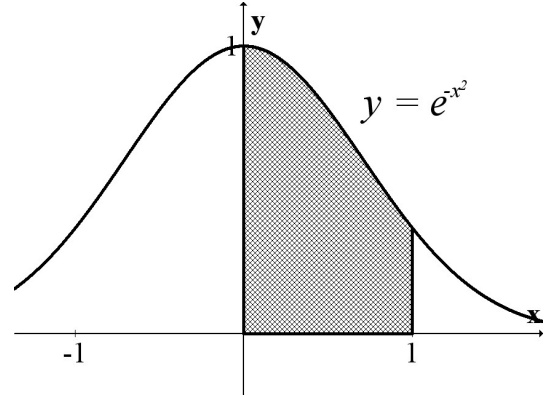
6. (10 pts) Consider the region bounded by $x = \frac{y}{2}$, $y = x^2$.

(a) (5 pts) Graph the region and label all points of intersection of the curves. Then find the area of the region.

(b) (5 pts) Find the volume of the solid obtained by rotating this region about the y -axis. (You can choose any appropriate method).

7. (9 pts) Consider the region bounded by $y = e^{-x^2}$, $x = 0$, $x = 1$, and $y = 0$ that is illustrated here.

- (a) (4 pts) Using the Disc/Washer (Perpendicular slicing) Method, set up (but DO NOT EVALUATE) the integral that gives the volume of the solid obtained by rotating the region about the horizontal line $y = -3$.



- (b) (5 pts) Using the method of cylindrical shells, **set up and evaluate** the integral that gives the volume of the solid obtained by rotating the region about the y -axis.