

Name: \_\_\_\_\_

Perm No.: \_\_\_\_\_

TA / Section Time :

## Math 34B - Midterm

February 8, 2008

### Instructions:

- This exam consists of 4 problems worth 10 points each, for a total of 40 possible points.
- You must show all your work and fully justify your answers in order to receive full credit. Please indicate your answers clearly by placing a BOX around them. You may leave your answers in unsimplified form. Partial credit will be awarded for work that is relevant and correct.
- No books, calculators or other devices are allowed. You may use one 3" x 5" notecard.
- BOX YOUR FINAL ANSWER. Write your answers and work on the test itself, in the space allotted. You may attach additional pages if necessary.

No.	Score
1	
2	
3	
4	
Total	

1. Integrate.

(a)  $\int_0^1 (3\sqrt{x} + 12x^2 - 2) dx$

(b)  $\int 3e^{-x/2} dx$

2. Let  $f(x) = 4 \sin\left(\frac{\pi x}{2}\right)$ .

(a) Find the amplitude, period and frequency of the sine wave given by  $f(x)$ .

(b) The graph of  $y = f(x)$  is given below. Find the area of the shaded region.

3. Let  $f(x) = xe^x$ .

(a) Find the first and second derivatives of  $f(x)$ .

(b) Find all critical points of  $f(x)$  and use the second derivative test to determine whether each is a relative minimum or relative maximum.

4. Business is booming at your lemonade stand. You are currently selling 30 cups of lemonade an hour at the price of \$1 a cup. However, due to inflation, the price for a cup of lemonade is currently increasing at the rate of 5 cents an hour, and your sales are currently decreasing at the rate of 3 cups per hour.

(a) What is your current hourly revenue from selling lemonade?

(b) At what rate (in \$/hour) is your hourly revenue changing at this instant?

(c) Use (a) and (b) to estimate your hourly revenue in 2 hours. (Use a linear approximation.)