

Midterm Exam

Math 10B
10/15/08

Name: _____
Section: _____

Read all of the following information before starting the exam:

- READ EACH OF THE PROBLEMS OF THE EXAM CAREFULLY!
- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Give your answers in exact form, for instance:

$$\frac{1}{2} (e^\pi + e^{2\pi}).$$

as opposed to 279.31617.

- A single $8\frac{1}{2} \times 11$ sheet of notes (double sided) is allowed. Calculators are permitted.
- Circle or otherwise indicate your final answers.
- Please keep your written answers clear, concise and to the point.
- This test has 5 problems and is worth 100 points. It is your responsibility to make sure that you have all of the pages!
- Turn off cellphones, etc.
- Good luck!

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1. (20 points)

a. (8 pts) The velocities in miles per hour of a decelerating car sampled over the course of an hour is given in the table below:

$t = 0$ min	10	20	30	40	50	60
$v = 60$ mph	55	52	37	30	25	20

Find a right hand estimate for the the distance the car has traveled over the course of the hour.

Identify n (the number of boxes), and Δt

You need not simplify your answer.

b. (4 pts) Is your answer an over- or under-estimate of the true value? Why?

c. (6 pts) Suppose $\int_1^e \ln(x) dx$ is estimated with a left hand Riemann sum. How many boxes are needed in order for the error to be less than $\frac{1}{100}$?

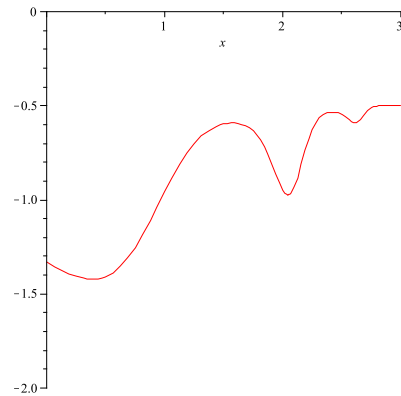
2. (20 points)

a. (10 pts) Suppose $f(x)$ is even, and $\int_{-10}^{10} f(x)dx = 20$ and $\int_{-5}^5 f(x)dx = 14$. Find $\int_5^{10} f(x)dx$.

b. (10 pts) Without computing the integral, is it true that $\int_{-10}^{10} e^{x^3 \sin(x)} dx > 0$. Why or why not?

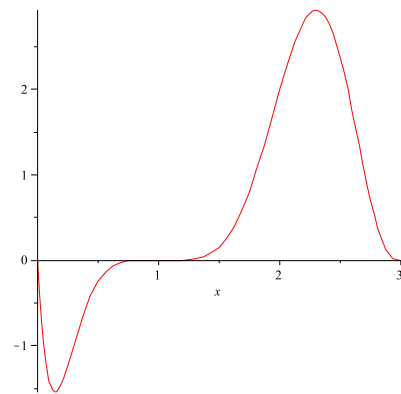
3. (20 points)

Below is a graph of $f'(x)$. NOTE: This is a graph of the *derivative* of f .



- a. (10 pts) Arrange the following in *increasing* order: $f(1)$, $f(2)$, $\frac{f(1)+f(2)}{2}$.

Below is a graph of $g'(x)$. Note: This is a graph of the *derivative* of g .



- b. (10 pts) Where does $g(x)$ obtain its *maximum* value on $0 \leq x \leq 3$?

4. (20 points)

Find the following indefinite integrals:

a. (6 pts)

$$\int \sqrt{x+3} + \frac{1}{\sqrt{x+4}} dx$$

b. (7 pts)

$$\int \tan(x) dx$$

. *Hint:* Write $\tan(x) = \frac{\sin(x)}{\cos(x)}$.

c. (7 pts)

$$\int xe^{2x} dx$$

5. (20 points)

a. (6 pts) Complete the statement of the first Fundamental Theorem of Calculus: Suppose f is continuous on $[a, b]$ and F is an antiderivative of f . Then . . .

b. (6 pts) Complete the statement of the second Fundamental Theorem of Calculus: Suppose f is continuous on an interval, and a is in that interval. Then . . .

c. (8 pts) Compute

$$\frac{d}{dx} \int_{\sin(x)}^5 e^t dt.$$