

MATH 116 — PRACTICE FOR EXAM 1

Generated January 6, 2016

NAME: SOLUTIONS

INSTRUCTOR: _____

SECTION NUMBER: _____

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1. This exam has 1 questions. Note that the problems are not of equal difficulty, so you may want to skip over and return to a problem on which you are stuck.
 2. Do not separate the pages of the exam. If any pages do become separated, write your name on them and point them out to your instructor when you hand in the exam.
 3. Please read the instructions for each individual exercise carefully. One of the skills being tested on this exam is your ability to interpret questions, so instructors will not answer questions about exam problems during the exam.
 4. Show an appropriate amount of work (including appropriate explanation) for each exercise so that the graders can see not only the answer but also how you obtained it. Include units in your answers where appropriate.
 5. You may use any calculator except a TI-92 (or other calculator with a full alphanumeric keypad). However, you must show work for any calculation which we have learned how to do in this course. You are also allowed two sides of a $3'' \times 5''$ note card.
 6. If you use graphs or tables to obtain an answer, be certain to include an explanation and sketch of the graph, and to write out the entries of the table that you use.
 7. You must use the methods learned in this course to solve all problems.

Semester	Exam	Problem	Name	Points	Score
Fall 2011	1	6	garden	14	
Total				14	

Recommended time (based on points): 13 minutes

6. [14 points] A botanical garden has the shape of the region in the xy -plane bounded by the curve $y = x^2$ and the x -axis, with $0 \leq x \leq 8$. One of the responsibilities of the gardener, is to keep the garden free of a poisonous weed. The density δ of the weed at any point in the garden depends on the distance x from the y -axis. Values of δ are given in kg of plants per meter square in the table below.

x (meters)	0	2	4	6	8
$\delta(x)$	10	12	15	17	18

- a. [3 points] Write an integral that computes the total amount of weed in the garden. Include units.

$$\text{Solution: } \int_0^8 x^2 \delta(x) dx \text{ kg}.$$

- b. [3 points] Compute RIGHT(4) for the integral in (a). Write out all the terms in the sum. Does this sum give an overestimate or an underestimate for the total amount of weed in the garden? Justify.

$$\text{Solution: } \int_0^8 x^2 \delta(x) dx \approx 2(2^2 \cdot 12 + 4^2 \cdot 15 + 6^2 \cdot 17 + 8^2 \cdot 18) = 4104.$$

RIGHT(4) is an overestimate because $\delta(x)$ is increasing and x^2 is increasing then $x^2\delta(x)$ is increasing.

- c. [2 points] Which of the following approximations to (a) are computable with the given data? Circle all that apply.

MID(1) MID(2) MID(3) MID(4)

Solution:

MID(1) MID(2) MID(3) MID(4)

- d. [1 point] Which Riemann sum gives the best estimate for the integral in (a)? Circle one.

RIGHT(4) LEFT(4) TRAP(4)

Solution:

RIGHT(4) LEFT(4) TRAP(4)

- e. [5 points] The gardener built a fence around the garden. How long is the fence? Include units. You may use your calculator.

$$\text{Length of the fence} = 8 + 64 + \int_0^8 \sqrt{1 + \left(\frac{d}{dx}(x^2)\right)^2} dx = 72 + \int_0^8 \sqrt{1 + 4x^2} dx = 136.99 \text{ meters.}$$

