

Math 125H - Winter 2012

Exam 2

February 23, 2012

Name: _____

Section: _____

Student ID Number: _____

PAGE 1	14	
PAGE 2	14	
PAGE 3	8	
PAGE 4	10	
PAGE 5	14	
Total	60	

- There are 5 pages of questions. Make sure your exam contains all these pages.
- You are allowed to use a scientific calculator (**no graphing calculators**) and one **hand-written** 8.5 by 11 inch page of notes.
- 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. (14 points) Compute the following integrals.

(a) $\int_1^e 9\sqrt{x} \ln(x) dx.$

(b) $\int_0^1 \frac{x+1}{x^2+4} dx$

2. (14 points) Compute the following integrals.

(a) $\int \sqrt{16 - 6x - x^2} \, dx.$

(b) $\int \frac{x + 1}{x^3 + 3x^2} \, dx .$

3. (8 pts) Consider the **improper** integral $\int_0^{\infty} \frac{x}{(x+a)^{5/2}} dx$, where a is a positive constant. If the integral converges, then find the value in terms of a . If it diverges, explain why.

4. (10 pts) Dr. Loveless goes for a jog on a straight path with velocity given by $v(t) = 3e^{-\sqrt{t}}$, where t is in hours and velocity is in miles per hour. At $t = 4$ hours of jogging, some former students jump out and throw water balloons at him. **Give units for all your answers below.**

(a) How far was Dr. Loveless from his starting at $t = 4$ hours?

(b) What was his average acceleration and average velocity over the first 4 hours?

i. Average velocity:

ii. Average acceleration:

5. (8 pts) After Dr. Loveless dries off, he continues his work out. He starts to lift a sandbag. The sandbag weighs 50 pounds when it is on the ground. As he lifts the bag it leaks out sand at a constant linear rate. When the sandbag is lifted 2 feet, it weighs 46 pounds. Before he passes out, Dr. Loveless does 145 foot-pounds of work in lifting the sandbag. How high did he lift the sandbag? Give your final answer as a decimal.
(Hint: Start by finding the linear function for weight (force) in terms of height.)

6. (6 points) Consider the region, R , bounded by $y = 4x^2$ and the x -axis between $x = 0$ and $x = 1$. Using both methods, cylindrical shells and cross-sectional slicing, set up two integrals for the volume of the solid obtained by rotating the region R about the **vertical line** $x = 6$. Only set up, DO NOT EVALUATE.

(a) Cross-sectional slicing:

(b) Cylindrical Shells: