

Math 125 - Winter 2015

Exam 2

February 26, 2015

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

Section: \_\_\_\_\_

Student ID Number: \_\_\_\_\_

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- There are 5 pages of questions. Make sure your exam contains all these questions.
- No calculators allowed!
- You are allowed 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.
- There may be multiple versions of the exam so if you copy off a neighbor and put down the answers from another version we will know you cheated. Any student found engaging in academic misconduct will receive a score of 0 on this exam. All suspicious behavior will be reported to the student misconduct board. In such an instance, you will be force to meet in front of a board of professors to explain your actions.  
**DO NOT CHEAT OR DO ANYTHING THAT LOOKS SUSPICIOUS!**  
**WE WILL REPORT YOU AND YOU MAY BE EXPELLED!**
- 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) Compute:

(a)  $\int \tan^{-1}(x) dx.$

(b)  $\int \frac{x^2 - 6}{2x^2 - x^3} dx.$

2. (12 points) Compute:

(a)  $\int \frac{x}{(x^2 + 4x + 13)^{3/2}} dx.$

(b)  $\int_0^{\pi/2} \cos^4(x) \sin^3(x) dx$

3. (13 points)

(a) Compute:  $\int \frac{\sqrt{x}}{\sqrt{x} + 3} dx$ .

(b) Consider the arc length of the curve  $f(x) = 30 \ln(x)$  from  $x = 1$  to  $x = 3$ .

i. (2 pts) Set up (DO NOT EVALUATE) an integral for this arc length.

ii. (5 pts) Use Simpson's rule with  $n = 4$  to approximate the value of the arc length.  
(You do not need to simplify your answer, leave it expanded out)

4. (13 points)

- (a) (7 pts) Evaluate the following **improper** integral:  $\int_0^{\infty} \frac{\sin(\pi e^{-x})}{e^x} dx$ .  
(Give the value if it converges, or show why it diverges).

- (b) The temperature for a particular object after  $t$  minutes is given by  $T(t) = 4te^{-2t}$  degrees Celsius. Find the average temperature from  $t = 0$  to  $t = 3$  minutes.

5. (10 points) The portion of the graph  $y = \frac{1}{9}x^2$  between  $x = 0$  and  $x = 3$  is rotated around the  $y$ -axis to form a container. The container is full of a liquid that has density 100 lbs/ft<sup>3</sup>. Find the work required to pump all of the liquid out over the side of the container. (Distance is measured in feet).

