

Math 125 - Spring 2017

Exam 2

May 18, 2017

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

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

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

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- There are 5 pages of questions. Make sure your exam contains all these questions.
- You are allowed to use a Ti-30x IIS Calculator model ONLY (**no other calculators allowed**). And you are allowed one **hand-written** 8.5 by 11 inch page of notes (front and back).
- Leave your answer in exact form. Simplify standard trig, inverse trig, natural logarithm, and root values. Here are several examples: you should write  $\sqrt{4} = 2$  and  $\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$  and  $\frac{7}{2} - \frac{3}{5} = \frac{29}{10}$  and  $\ln(1) = 0$  and  $\tan^{-1}(1) = \frac{\pi}{4}$ . Also an answer containing an inverse trig inside of a trig function (such as  $\cos(\sin^{-1}(x))$  or  $\sin(2\cos^{-1}(x))$ ) is not acceptable, instead simplify using the methods from class.
- 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.**
- If you need more room, use 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.  
DO NOT CHEAT OR DO ANYTHING THAT LOOKS SUSPICIOUS!  
WE WILL REPORT YOU AND YOU MAY BE EXPELLED!  
Keep your eyes down and on your paper. If your TA sees your eyes wandering they will warn you only once before taking your exam from you.
- You have 80 minutes to complete the exam. Budget your time wisely.  
**SPEND NO MORE THAN 10 MINUTES PER PAGE!**

GOOD LUCK!

1. (12 points) Evaluate

(a)  $\int_0^4 \sqrt{x}e^{\sqrt{x}} dx$

(b)  $\int \frac{x+9}{x^3+3x^2} dx$

2. (12 points) Evaluate

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

(b)  $\int \frac{\cos(x) \sin(x)}{2\sqrt[3]{\sin(x) + 2}} dx$

3. (12 points) Evaluate

(a)  $\int_0^{\pi/4} \cos^4(x) dx$

(b)  $\int \frac{x^4 + x + 1}{x^2 + 9} dx$

4. (12 pts)

(a) Use the trapezoid rule with  $n = 4$  to approximate the arc length of  $f(x) = x^2 - x$  from  $x = 0$  to  $x = 2$ . (You can leave your answer expanded out with all the correct numbers in all the correct places)

(b) Consider the improper integral  $\int_1^{\infty} \frac{\ln(x)}{\sqrt{x}} dx$ . Determine if it converges or diverges. If it converges give the value. (You MUST write as a limit, integrate and show your work).

5. (12 points) The portion of the graph  $y = x^2$  between  $x = 0$  and  $x = 2$  is rotated around the  $y$ -axis to form a container. The container is partially filled with water, up to the level  $y = 3$ .

Find the work required to pump all of the water out over the top of the side of the container.

Give your answer (in joules) in exact form. (Distance is in meters, the density is  $1000 \text{ kg/m}^3$ , and the acceleration due to gravity is  $9.8 \text{ m/s}^2$ .)

