Math 125 - Winter 2018
Exam 2
Feb. 22, 2018

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 triangle method 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.
- You have 80 minutes to complete the exam. Budget your time wisely.
SPEND NO MORE THAN 10 MINUTES PER PAGE!

GOOD LUCK!

1. (12 pts) Evaluate

(a) $\int \frac{9x^2}{(x-1)^2(x+2)}dx$

(b) $\int \tan^{10}(2x)\sec^4(2x)\ dx$

2. (12 pts) Evaluate (Trig function should not appear in your final answers, simplify!)

(a) $\int_0^{\pi^2/16} \sin(\sqrt{x})\ dx$

(b) $\int \frac{1}{(x^2+6x+25)^{3/2}} dx$

3. (12 points) Evaluate (Simplify and give exact form.)

(a) $\int_0^1 \frac{1}{e^x + 1}\, dx$

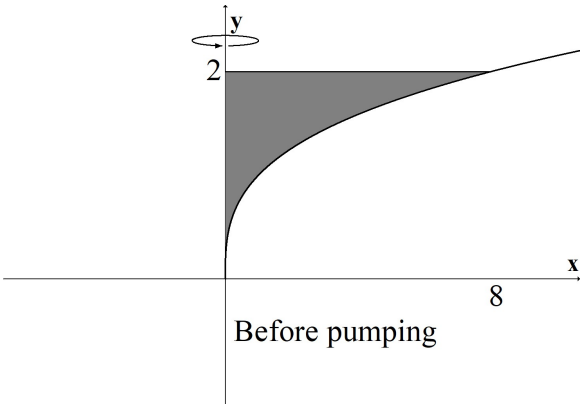
(b) $\int \sqrt{4 - x^2}\, dx$

4. (14 pts) For your answers below, simplify and give exact form.

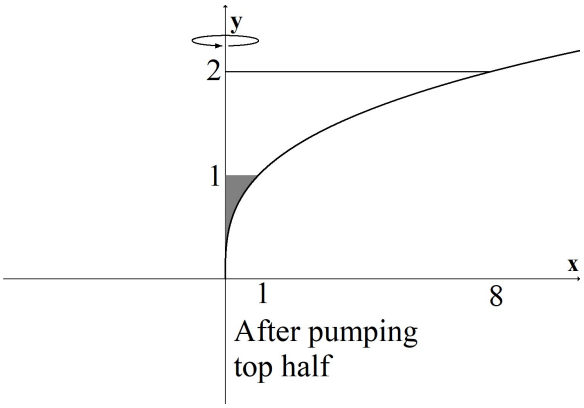
   (a) Find the average value of $4x\ln(x+1)$ from $x=0$ to $x=2$.

   (b) Determine if the improper integral below converges or diverges. If it converges, then give the value. You MUST correctly show your work.
   $\int_0^\infty \frac{1}{x^2+2x+2}\,dx.$

5. (10 points) The region bounded by $y = \sqrt[3]{x}$, $x = 0$, and $y = 2$ is rotated about the y-axis to form a container. Distances are measured in feet. Initially, the tank is full of a fluid that has a density of 20 lbs/ft^3. How much work is done to pump the top 1 foot of liquid out of the container?
Set up AND evaluate, but you do not have to simplify your final numerical answer.
Instead give a decimal accurate to two digits after the decimal. Include units.



Before pumping



After pumping
top half