

Math 125 - Fall 2017

Exam 2

Nov. 16, 2017

Name: _____

Section: _____

Student ID Number: _____

PAGE 1	12	
PAGE 2	12	
PAGE 3	12	
PAGE 4	12	
PAGE 5	12	
Total	60	

- 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 $\tan^{-1}(1) = \frac{\pi}{4}$.
- 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) $\int \frac{x-1}{x^3-2x^2} dx$

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

2. (12 pts) Evaluate

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

(b) $\int \frac{\ln(x)}{x^5} dx$

3. (12 points) Evaluate

(a) $\int x^2 \sin^2(x^3) \cos^2(x^3) dx$

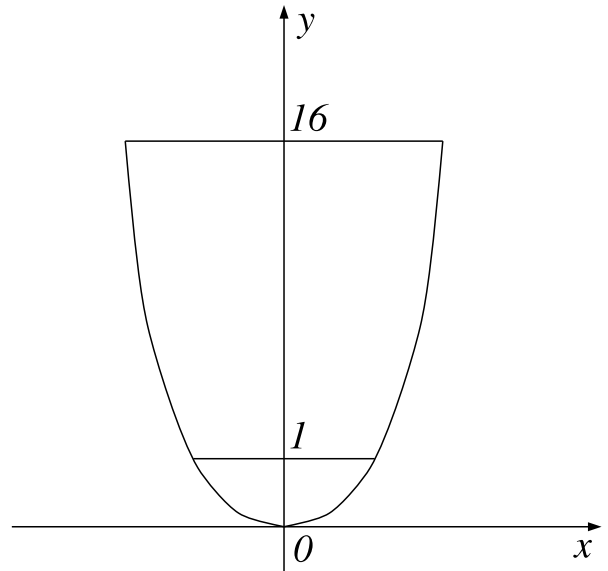
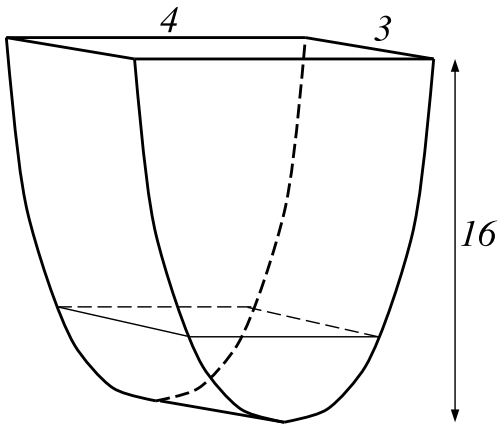
(b) $\int \frac{x}{x^2 + 6x + 13} dx$

4. (12 pts)

(a) Use Simpson's rule with $n = 4$ subdivisions to approximate the *average value* of $f(x) = e^{4x^2}$ on the interval $x = 1$ to $x = 3$. (You can leave your answer expanded out with all the correct numbers in all the correct places).

(b) Consider the improper integral $\int_1^4 \frac{1}{(\sqrt{x} - 1)^{1/2}} dx$. 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)



A tank is 16 feet high, with an open rectangular top of width 3 ft and length 4 ft. Each horizontal cross-section of the tank is a rectangle of fixed width 3 feet and length that changes with height. The figure above-left shows the tank. The figure above-right shows the front face of the tank, which has the shape of the function: $f(x) = 4x^2$.

Initially, there is fluid in the tank up to a height of 1 foot. The fluid weighs 15 lb/ft³. How much work is done to empty the tank by pumping all of the fluid to the top of the tank?