Math 125 - Spring 2013
Exam 2
May 23, 2013

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 scientific calculator (**no graphing calculators and no calculators that have calculus capabilities**) 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.
- 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 the following integrals.

   (a) $\displaystyle\int_0^2 \frac{x^2+3x-5}{x+1}\,dx.$

   (b) $\displaystyle\int x^4 \ln(3x) + e^{-5x}\,dx$

2. (12 points) Compute the following integrals.

(a) $\displaystyle\int \frac{x^2+7}{x^2(3-x)}\,dx.$

(b) $\displaystyle\int \frac{1}{(x^2+6x+13)^{3/2}}\,dx.$

3. (12 points) Answer the following questions

(a) Find the average value of $f(x) = \sin^3(2x)\cos^5(2x)$ on the interval $x = \frac{\pi}{4}$ to $x = \frac{\pi}{2}$.

(b) Evaluate: $\int_1^\infty \frac{1}{(x+1)\sqrt{x}} dx$. (Give the value if it converges, or show why it diverges).

4. (12 pts)

(a) Find the length of the curve $f(x) = \frac{1}{4}x^2 - \frac{1}{2}\ln(x)$ from $x = 1$ to $x = 5$.

(b) Approximate $\int_1^3 \sqrt{x^3 + 1}\, dx$ using Simpson's rule and $n = 4$ subintervals. (Give your final answer as a decimal to four digits).

5. (12 points) A large crane is 300 feet above the ground. It has a cable with density 5 lbs/ft that reaches all the way down to the ground.

   (a) If a 100 lbs object is attached to the bottom of the cable, how much total work is done in lifting the object the entire 300 feet?

   (b) At the end of the day, there is only enough fuel left for the crane to do 20,000 ft-lbs of work. Currently, the cable is extended the full 300 feet to the ground and there is NO object attached to the end. How high can it lift the cable before it runs out of fuel?

   A picture is provided with labels you should find helpful, I suggest you find a first. (Give your final answer for h as a decimal to four digits).