Math 125, Section E, Spring 2011, Midterm II

May 19, 2011

Name⎯⎯⎯

TA/Section⎯⎯⎯

Instructions.

- There are 4 questions. The exam is out of 40 points.

- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. **Hand in your notes with your exam paper.**

- You may use a calculator which does not graph and which is not programmable. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)

- **Show your work**. If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me. Please ⏤BOX⏤ your final answer.

Question	points
1	
2	
3	
4	
Total	

1. (a) (5 points) Evaluate

$$\int_1^5 (\ln x)^2 dx.$$

(b) (5 points) Use Simpson's rule with $n = 6$ to estimate the integral in part (a) and compare your answers.

2. Evaluate the following defnite integrals.

(a) (5 points)

$$\int_0^1 \frac{x^3}{\sqrt{4 - x^2}} \, dx$$

(b) (5 points)

$$\int_0^{\ln 2} \frac{e^x}{e^{2x} + 6e^x + 10} \, dx$$

3. Does the improper integral
$$\int_1^\infty \frac{x+6}{x^3+3x^2}\,dx$$
converge or diverge? If it converges, find the value it converges to. If it diverges, explain why.

4. A 30 ft crane is lifting a container full of concrete to the top of a 320 ft building. The container itself is 500 lbs and holds 6000 pounds of concrete. Initially, it is full and on the ground. The chain connecting the container to the crane weighs 7 lbs/ft. The crane pulls the chain at a rate of 360 ft/min and concrete leaks out at a rate of 3 lbs/min. Find the work done in lifting this container (and chain) to the top of the building. Hint: First, find the weight of the container+concerete+chain when the container is y feet from the ground.