Math 125 H - Winter 2012
Exam 1
January 26, 2012

Name: _____

Section: _____

Student ID Number: _____

PAGE 1	10	
PAGE 2	8	
PAGE 3	15	
PAGE 4	15	
PAGE 5	12	
Total	60	

- There are 6 questions spanning 5 pages. Make sure your exam contains all these questions.
- You are allowed to use a scientific calculator (**no graphing calculators**) 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, simplified 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.
- Any student found engaging in academic misconduct will receive a score of 0 on this exam.
- You have 80 minutes to complete the exam. Budget your time wisely.
SPEND NO MORE THAN 15 MINUTES PER PAGE!

GOOD LUCK!

1. (10 pts) Evaluate the integrals.

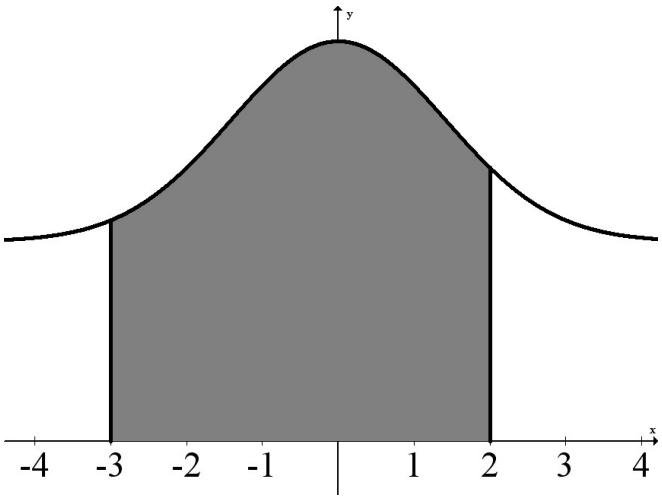
(a) $\displaystyle\int \frac{x^3(1-x^{5/2})}{\sqrt{x}} + e^{3x-2}\, dx$

(b) $\displaystyle\int_{1/2}^{e/2} \frac{\sec(\ln(2x))\tan(\ln(2x))}{x}\, dx$

2. (8 pts) A long wall is in the shape of region between $f(x) = 1 + e^{(-x^2/4)}$ and the x-axis. Two painters start at the origin. One moves in the positive x-direction at a constant rate of 2 feet/minute. The other moves in the negative x-direction at a constant rate of 3 feet/minute. They paint the region of the fall in front of them as they go. (The picture below depicts the painted region after $t = 1$ minute).

(a) (3 pts)

Set up an integral (DO NOT EVALUATE) that gives the area of the wall painted region of the wall after t minutes. (Hint: Your answer will contain the variable t).



(b) (5 pts) At what **rate** is the area of the painted region changing at $t = 2$ minutes?

3. (7 pts) Evaluate $\displaystyle\int_{\pi/4}^{3\pi/4} \left|\cos(x)\sin^2(x)\right| \, dx$

4. (8 pts) Consider the integral $\displaystyle\int_1^7 \sin(\sqrt{x}) \, dx$.

   (a) Approximate this integral using the right endpoint method with $n = 4$ subdivisions. Show your work by writing out all the terms of the sum, then give the decimal value of the approximation.

   (b) In terms of n in general, write out the formal Reimann sum definition (involving a limit and sigma notation) using the right endpoint method for the integral.

5. (15 points) Consider the region, R, bounded by the curve $y = 2x$ and $y = x^2$.

   (a) (5 pts) Give the area of the region.

   (b) (5 pts) Does the line $y = 1$ divide the region R in half?
   (Justify your answer with at least one integral calculation).

   (c) (5 pts) Set up AND evaluate and integral for the volume of the solid obtained by rotating R about the x-axis.

6. (12 pts) Dr. Loveless is baking again. He has made a cake in shape of the region bounded in the **first quadrant** by $y = 1 - x^4$ (shown in the picture). He says if you can cut the cake in thirds, he'll eat a third, you'll eat a third and you can throw the last third in his face. BUT, you must cut it using two lines of the form $y = 1 - ax$ and $y = 1 - bx$. Find a and b.