Math 125 - Spring 2013
Exam 1
April 25, 2013

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 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 pts) Evaluate the following integrals

(a) $\displaystyle\int_1^8 3 + \frac{2}{x^{2/3}}\,dx$

(b) $\displaystyle\int \frac{x^2}{\cos^2(x^3)}\,dx$

2. (12 pts) Evaluate the following integrals

(a) $\int x^3(4-x^2)^6\,dx$

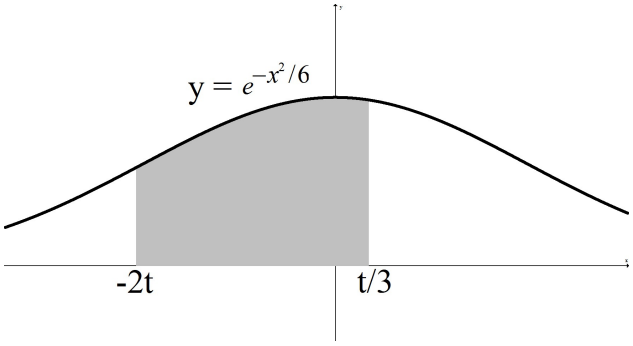
(b) $\int_{1/4}^{1} \frac{\cos(\pi\sqrt{x})}{\sqrt{x}}\,dx$

3. The two parts below are separate unrelated problems.

(a) (6 pts) The top of a wall is in the shape of $y = e^{-x^2}$ and the bottom is the x-axis, where x and y are in feet. The wall is being painted in such a way that the area covered at time t minutes is given by

$$A(t) = \int_{-2t}^{\frac{1}{3}t} e^{-\frac{1}{6}x^2}\, dx.$$

Find the rate at which the wall is being painted at $t = 2$ minutes.
That is, find derivative of $A(t)$ at $t = 2$. (Give units)



(b) (6 pts) Use the left-endpoint rule with $n = 3$ subdivisions to approximate the area of the region bounded by $y = 4 - x^2$ in the first quadrant (the first quadrant is where $x \geq 0$ and $y \geq 0$). Write out your work and give your final answer as a decimal to 4 digits after the decimal point.

4. The two parts below are separate unrelated problems.

   (a) (6 pts) Find a function $f(x)$ such that $f''(x) = 6x^2 - \sin(x)$, with $f\left(\frac{\pi}{2}\right) = \frac{3\pi}{2}$ and $f'(0) = 4$.

   (b) (6 pts) You are standing on top of a tall building exactly 200 meters above your math instructor. You 'accidentally' throw a water balloon straight down. The water balloon lands on your unsuspecting instructor's head after exactly 4 seconds. At what initial velocity did you throw the balloon? (Assume acceleration is a constant -9.8 m/sec^2).

5. (12 points) Consider the region, R, bounded by the curve $y = x^4$, the **vertical** line $x = 2$, and the x-axis.

   (a) (1 pts) Sketch the region R.

   (b) (5 pts) Find the value of a, such that the **vertical** line $x = a$ would divide the region R into two regions of equal area.

   (c) (6 pts) A solid is obtained by rotating the region R around the **horizontal** line $y = -3$. Set up BOTH of the integrals you get from the cylindrical shells and washer methods. (DO NOT EVALUATE)

   SHELLS:

   WASHERS: