Math 120 - Fall 2009
Exam 1
October 22, 2009

Name: _____

Section: _____

Student ID Number: _____

1	13	
2	11	
3	14	
4	12	
Total	50	

- You are allowed to use a scientific calculator (**NO GRAPHING CALCULATORS**) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.

- Check that your exam contains all the problems listed above.

- You must show your work on all problems. The correct answer with no supporting work may result in no credit. Unless otherwise indicated, your **final answer** must be correct to two digits after the decimal.

- Guess and check methods are not sufficient, you must use appropriate methods from class.

- 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. Any student found engaging in academic misconduct will receive a score of 0 on this exam (we take this very seriously, if you are found cheating you will at least get academic probation or you may be expelled from school).

- You have 50 minutes to complete the exam.
  START BY LOOKING THROUGH ALL THE PROBLEMS AND USE YOUR TIME WISELY.
  Check your time after you complete each problem and manage your time accordingly. Remember that significant partial credit may be given to correct work, so show me what you know!
  SPEND NO MORE THAN 10 MINUTES PER PAGE!

GOOD LUCK!

1. (13 points) Tara and Katie are golfing. Katie's ball is located 60 feet west and 30 feet south of the cup. The cup is in the center of a circular green of radius 20 feet. Tara is standing on the green at the location 2 feet east and 10 feet north of the hole. Katie hits her ball so that it travels in a straight line through the **westernmost** edge of the green. The ball continues on the same straight line path and exits the green.

(a) (8 pts) Find the location where the ball exits the green. (Describe the location relative to the hole).
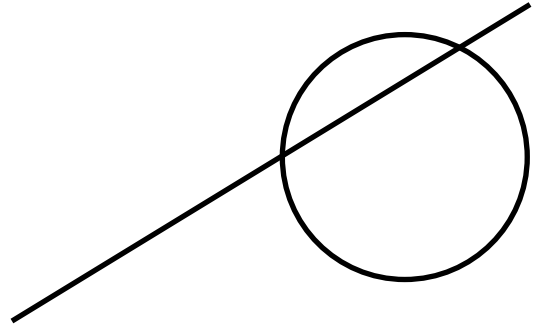
(b) (5 pts) How close does the ball come to hitting Tara?

2. (11 points) Peyton and Eli start running at the same time at constant speeds on straight line paths in the coordinate system (*i.e.* they are exhibiting **uniform linear motion**). Peyton starts at the point $(-2, 11)$ and runs toward the point $(5, -13)$ at a constant speed of 4 ft/sec (the coordinate points are in feet).

   (a) (6 pts) Find the parametric equations that describe Peyton's uniform linear motion.

   (b) (5 pts) Eli starts at the point (10,7) and he runs toward the point where Peyton crosses the y-axis. How fast does Eli need to run in order to reach this point at the same time as Peyton? (Give Eli's speed in ft/sec)

3. (14 points) Kurt kicks a soccer ball from the origin in the coordinate system below. A silo that is 5 feet wide and 100 feet tall is 20 feet from the location where Kurt kicked the ball. The ball follows the path given by the quadratic function $f(x) = -2x^2 + 53x$. This situation is sketched below (the graph may not be to scale).

(a) (4 pts) Give the x and y coordinates of the highest point the ball reaches.

100 ft

20 ft   5 ft
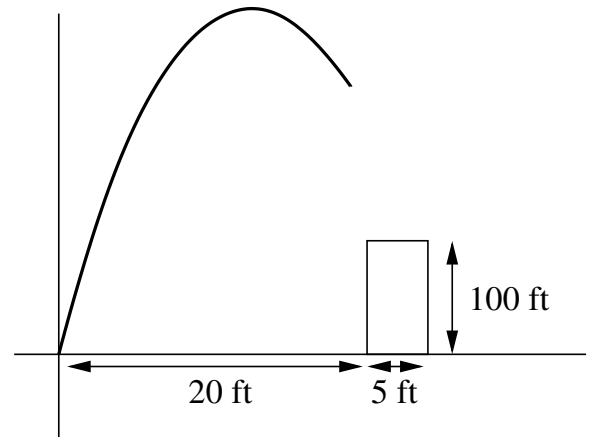
(b) (5 pts) If the ball continues on this path, will it hit the top of the silo? If so, give the (x, y) coordinates of where it lands on the top. If not, explain why.

(c) (5 pts) Find and simplify the expression for $\dfrac{f(x + h) - f(x)}{h}$

4. (12 points) Two geometry teachers get married and have a trapezoidal cake at their wedding (the view from above the cake is given). A vertical cut is made at a location x inches from the left edge and the length of the cut is labeled y. This breaks the cake into two pieces (the one on the left and the one on the right). Two possible scenarios are depicted below depending on the location of the cut.
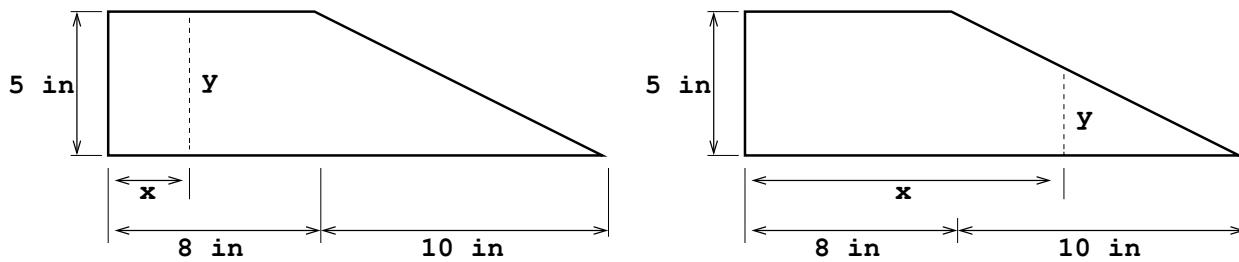
(a) (5 pts) Find a formula for y as a multipart function of x

(b) (4 pts) Find a formula for the area of the piece to the left of the cut as a multipart function of x.

(c) (3 pts) At what x value would the cut need to be made in order to cut the cake in half?