Math 120 - Fall 2008
Exam 2
November 13, 2008

Name: _____

Section: _____

Student ID Number: _____

1	11	
2	18	
3	10	
4	11	
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.
- Show your work. The correct answer with no supporting work may result in no credit. Guess and check methods are not sufficient, you must use appropriate methods from class.
- Unless otherwise indicated, your **final answer** must be correct to two digits after the decimal.
- There are multiple versions of the exam. Cheating will not be tolerated. Keep your eyes on your exam!
- You have 50 minutes to complete the exam. Leave nothing blank, show me what you know!

GOOD LUCK!

1. (11 points) Bob is training so that he will be able to eat as much pie as possible on Thanksgiving. The number of slices of pie he can eat, y, is a **linear-to-linear rational function** of the days, x, that he trains.

   If Bob trains for 10 days, he can eat 5 slices of pie.

   If Bob trains for 20 days, he can eat 6 slices of pie.

   As Bob trains more and more, the number of slices of pie that he can eat approaches, but does not exceed, 8 slices.

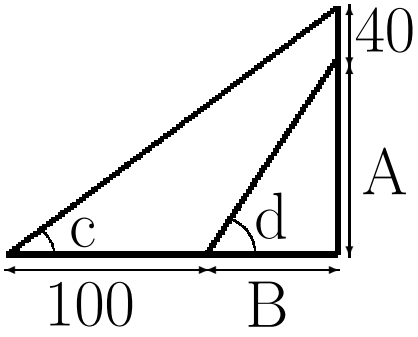
   How many days would Bob need to train in order to be able to eat 7 slices of pie on Thanksgiving? (Round your answer to the nearest day.)

2. (18 points)

(a) (5 pts) If $f(x) = ax + 5$ and $f(f(x)) = 4x - 5$, then what is the value of a?

(b) (5 pts) Find the inverse of $f(x) = x^2 - 4x$ where the domain is restricted to $x \leq 2$.

(c) (8 pts) Let $c = 35$ degrees and $d = 55$ degrees in the picture below.
Using the given lengths (which are in feet), find the lengths A and B.
(Round your answer to the nearest foot).



3. (10 points) A weight is attached to a spring and is hanging from the ceiling. At some initial time, $t = 0$, the weight begins oscillating up and down so that the height off the ground is a **sinusoidal function** of time. At time $t = 5$ second, the weight is at its lowest point of 5 inches off the ground. At $t = 12$ seconds, the spring is at its highest point of 25 inches off the ground.

   (a) Find the sinusoidal model, $h(t)$, which gives height in terms of time.

   (b) Find the initial height of the weight.

4. (11 points) Alfred is running counter-clockwise around a circular track. He starts running ($t = 0$) at some point in the southwestern quadrant of the track (third quadrant).

   Alfred completes one lap in 80 seconds and he is running at a (linear) speed of 15 feet/second. It takes Alfred 5 seconds to reach the southernmost point.

   Sketch a picture of this scenario and impose a coordinate system with the center of the circle as the origin.

   Give Alfred's x and y coordinates after 2 minutes.