Math 120 A - Spring 2014
Midterm Exam Number One
April 24, 2014

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	10	
2	10	
3	15	
4	15	
5	10	
Total	60	

- This exam consists of FIVE problems on SIX pages, including this cover sheet.

- Show all work for full credit.

- You may use a scientific calculator during this exam. Graphing calculators are not permitted. Also, other electronic devices are not allowed, and should be turned off and put away for the duration of the exam.

- You do not need to simplify your answers.

- If you use a trial-and-error or guess-and-check method when a more rigorous method is available, you will not receive full credit.

- If you write on the back of the page, please indicate that you have done so!

- You may use one hand-written double-sided 8.5″ by 11″ page of notes.

- You have 50 minutes to complete the exam.

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1. **[5 points each]**

   (a) Bevers stands at the point $(5, -2)$ and walks in a straight line towards $(6, 13)$ at a constant speed, reaching it in 5 seconds.

   Give parametric equations for Bevers's location t seconds after he starts walking.

   (b) Lincoln stands at $(3.5, 7)$ and walks in a straight line towards $(8, 4.6)$ at a speed of 3 units per second.

   Give parametric equations for Lincoln's location t seconds after he starts walking.

2. **[10 points]** Compute the fixed points of the following multipart function. That is, find all solutions to the equation $f(x) = x$. **Show all of your work!**

$$f(x) = \begin{cases} 2x & \text{if } x \leq -2 \\ 4x^2 + 2x - 14 & \text{if } -2 < x < 2 \\ 6 & \text{if } x \geq 2 \end{cases}$$

3. **[15 points]** Hansel stands 8 kilometers north and 1.4 kilometers west of the northern-most point of a circular forest with radius 5 kilometers. He walks south at a speed of 4.5 kilometers per hour until he reaches the forest, then continues south at a speed of 2.5 kilometers per hour until he exits the forest.

How long does he spend walking, from where he starts until the point where he exits the forest? **Express your answer in minutes.**

North

West ← | → East

South
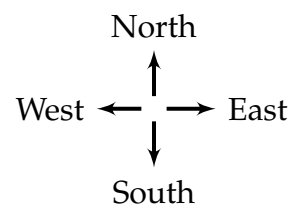
*Here's a compass rose, in case you get lost in the forest.

4. **[15 points]** Circe lives 5 miles north and 10 miles east of Dido. Helen lives 5 miles west and 1 mile north of Circe.

Dido walks in a straight line from her house towards Circe's house, until she reaches the point on her path which is closest to Helen's house. Then she walks to Helen's house.

How far does she walk, in total?

5. **[10 points]** You have an L-shaped cake, shown below, which you would like to cut by making a vertical line x units from the left end of the cake. Notice that there are two possible shapes for the piece you cut, depending on whether you cut to the left or the right of the inner corner.

Write a multipart function $f(x)$ for the area of the piece on the left side of the cut, as a function of x. Include the correct domain.