

Math 120 A, B Winter 2013
Mid-Term Exam Number One
January 31, 2013

Name: _____

Student ID no. : _____

Signature: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.
- Show all work for full credit.
- You may use a scientific calculator during this examination. Graphing calculators are not allowed. Also, other electronic devices are not allowed, and should be turned off and put away for the duration of the exam.
- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes. Write your name on your notesheet and turn it in with your exam.
- You have 50 minutes to complete the exam.

1. Shin and Hannah are lost in the desert. Shin is 4 km north and 3 km east of Hannah. At the same time, they both begin walking due east. Shin walks at 2.5 km/hr, and Hannah walks at 4 km/hr.

(a) When will they be 8 km apart? Give your answer in hours after they start walking.

(b) When will the line through their locations be perpendicular to the line through their starting locations? Give your answer in hours after they start walking.

2. Alice stood at the southernmost point on the edge of a circular lake.

The lake had a radius of 4 km.

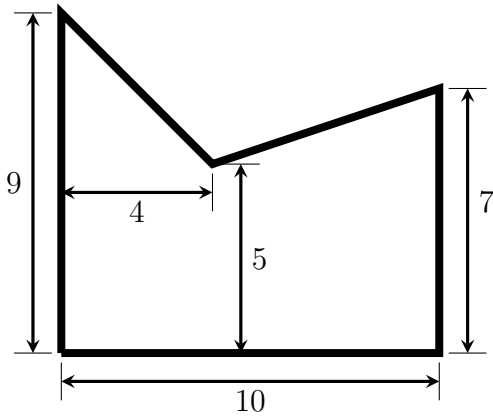
She then dove into the lake and swam in a straight line toward a point 6 km west and 5 km north of the center of the lake.

When she reached the edge of the lake she stopped swimming.

(a) What was the length of her swim (in kilometers)?

(b) Consider the point on her swim where she was closest to the westernmost point of the lake. How far west of the center of the lake was that point?

3. You are going to cut a piece of sheet steel with a vertical cut x cm from its left edge. The steel is shaped as shown in the figure below. All dimensions are in cm.



Express the area to the left of the cut as a multipart function of x .

4. (a) Let $f(x) = 2x^2 - x + 6$. Simplify the expression below as much as possible:

$$\frac{f(x+h) - f(x-h)}{h}$$

- (b) Let $g(x) = 2x - |3 - x|$. Find all solutions to the equation $g(a) = 3 + \frac{1}{3}a$.