# Math 120 B - Autumn 2013
# Mid-Term Exam Number One
# October 17, 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.

(Version 1)

1. Devra's swimming pool has a radius of 9 meters. She stands 7 meters west and 5 meters south of the westernmost point of the pool, and begins running toward the easternmost point of the pool. Once Devra reaches the pool, she continues towards the easternmost point, swimming at a speed of 2 meters per second, and exits the pool once she reaches the end.

   How much time does Devra spend swimming across the pool?

2. Beverley is 12 feet north and 6 feet west of Avon, and Chelsea is 1 foot west and 5 feet south of Beverley.

   Avon walks straight towards Beverley. When he reaches the point on his path which is closest to Chelsea, he turns and walks east for 4 feet, and then turns one more time and walks straight back to where he originally started.

   How far does Avon walk, in total?

3. Iphigenia and Ethelbert awoke one morning to find themselves on a rather large piece of graph paper. Not knowing what else to do in this situation, they decided to at least make a math problem out of it.

   Iphigenia stood at $(6, 2)$ and Ethelbert stood at the origin. Then, at the same time, they both began walking:

   Iphigenia headed towards the $y$-axis (walking parallel to the $x$-axis) at a constant speed of 4 units per second.

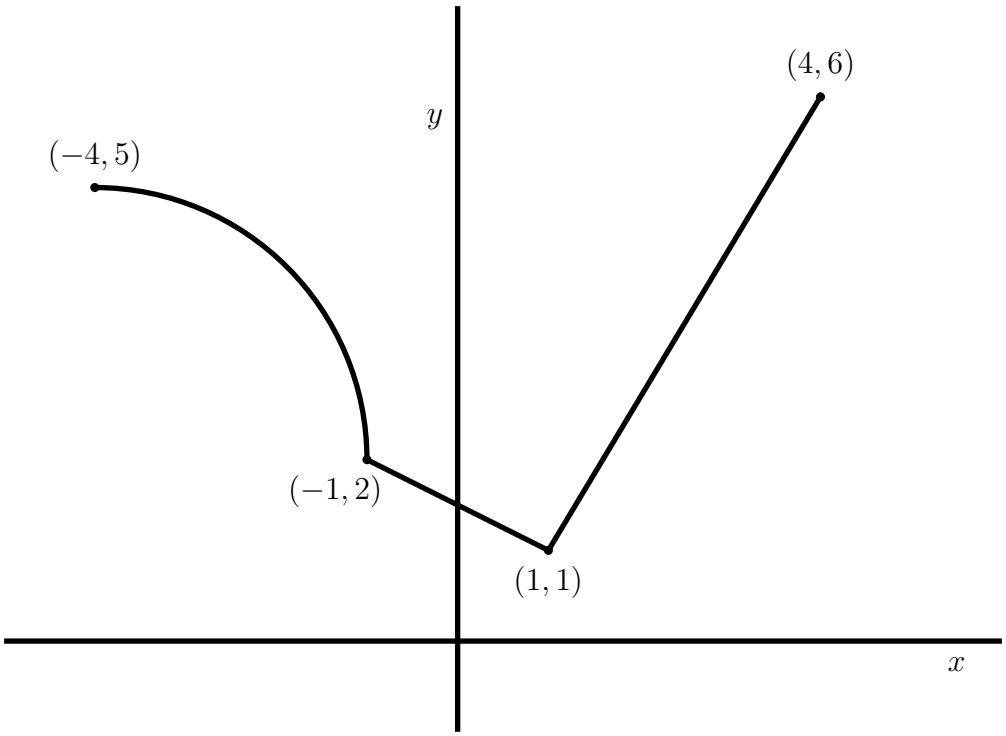
   Ethelbert headed straight towards Iphigenia's starting position, reached it 3 seconds later, and kept on walking in a straight line at a constant speed.

   (a) What are Iphigenia's parametric equations of motion?

   (b) What are Ethelbert's parametric equations of motion?

   (c) Give a formula for the distance between Iphigenia and Ethelbert after $t$ seconds.

4. Below is the graph of a multipart function, $f(x)$, composed of one quarter-circular arc and two straight lines.




(a) Write the multipart rule for this function.

(b) Find all values of $x$ for which $f(x) = 4$.