

Math 120 C - Autumn 2010  
Mid-Term Exam Number One  
October 21, 2010

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. Graphic 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. The city of Arb is 14 km EAST and 7 km NORTH of the city of Ott.

The city of Bim is 5 km EAST and 3 km SOUTH of Ott.

The city of Cup is 1 km WEST and 6 km NORTH of Ott.

If you travel along a straight line from Arb to Bim, how close do you come to Cup?

2. Fred is moving at a constant speed along a line in the  $xy$ -plane. He starts from the point  $(-2, -6)$  and heads directly toward the point  $(8, 14)$ , reaching it after 5 seconds.

(a) Give Fred's parametric equations of motion.

(b) Determine all times when Fred is a distance of 3 units from the origin.

3. Abby and Zev are at a campsite in a desert. At 7 AM, Zev wakes up and starts walking NORTH at 3 km per hour. At 9 AM, Abby wakes up and starts walking EAST at 4 km per hour. At 11 AM, Zev changes his speed, and continues walking NORTH at 5 km per hour.

Express the distance between Abby and Zev as a multipart function of the time,  $t$ , that Zev has been walking. You need only consider  $t \geq 0$ .

4. The function  $f(x)$  is quadratic. The vertex of the graph of  $f(x)$  is the point  $(1, 4)$ . The graph of  $f(x)$  passes through the point  $(-2, 31)$ .

(a) Express  $f(x)$  in the form  $f(x) = ax^2 + bx + c$ .

(b) Simplify the expression

$$\frac{f(x+r) - f(x+2r)}{r}$$

as far as possible. Assume  $r$  is a non-zero constant.