

Math 120 B, C - Autumn 2008  
Mid-Term Exam Number Two  
November 13, 2008

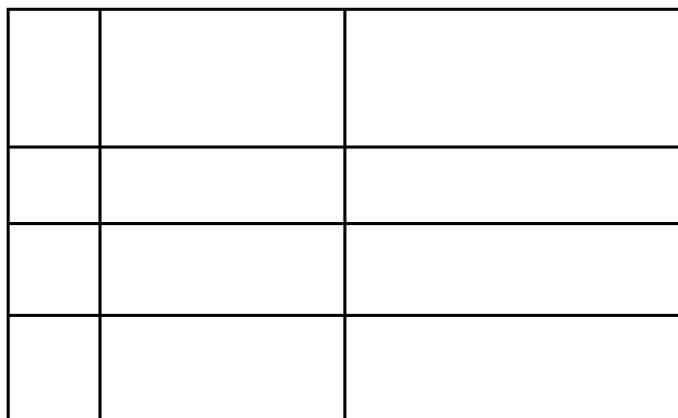
Name: \_\_\_\_\_ Student ID no. : \_\_\_\_\_

Signature: \_\_\_\_\_ Section: \_\_\_\_\_

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.
- 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, or read a numerical solution from a graph on your calculator 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.
- Show all work for full credit.
- You have 50 minutes to complete the exam.

1. You have 205 meters of fencing with which to make a rectangular enclosure. You will use the fencing to create the rectangle, and to make partitions as shown in the example below to create 12 rectangular sections inside the rectangle.



What should the dimensions of the enclosure be to make the area of the enclosure as large as possible?

2. Rita has been practicing throwing a javelin. Without practicing, she could throw it 10 meters. After practicing for 40 hours, she could throw it 50 meters. The more she practices, the farther she will be able to throw it, but she will never be able to throw it more than 70 meters. The length of her throws is a linear-to-linear rational function of the number of hours that she practices.

(a) Find the function,  $f(x)$ , relating the length of her throws to the number of hours,  $x$ , that she practices.

(b) Find the inverse function of the function,  $f(x)$ , that you found in part (a).

3. Godzilla is attacking - you must flee! As you flee, you will take measurements to hopefully help defeat Godzilla. You first measure the angle from the ground up to the top of Godzilla's head; the angle is  $60^\circ$ . You then run 80 meters farther from Godzilla and measure again; this time the angle is  $55^\circ$ . However, between the two measurements, Godzilla grew 8 percent taller.

Find Godzilla's height at the time of the second measurement.

4. After injecting a certain drug, the diameter of Sven's pupil is a sinusoidal function of time. Five minutes after the injection, his pupil was at its maximum size: the diameter was 7 mm. His pupil then shrunk to its minimum diameter, 3 mm, 92 minutes after the injection.

What was the diameter of his pupil one hour after the injection?