Math 120 A - Winter 2008
Mid-Term Exam Number Two
February 28, 2008

Name: _____ Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.
- You may use a calculator during this examination. 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.

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1. Paolo is running at a constant speed of 3 meters per second around a circular track. He runs clockwise around the track. From his starting point, it takes him 82 seconds to reach the northernmost point of the track. He takes 305 seconds to complete one lap of the track.

   After running for 12 minutes, how far (in a straight line) is he from the westernmost point of the track?

2. Lucy's height is a linear-to-linear rational function of time. Today, her height is 10 feet. One year from today her height will be 15 feet. Five years from today, her height will be 20 feet.

   How tall will she be 30 years from today?

3. Graham had an accident, and injured his left foot. As a result, his foot is swelling and contracting in such a way that its length is a sinusoidal function of time. One hour after his accident, his foot had swelled to its maximum length: 30 cm. It then decreased in length, reaching its minimum length, 22 cm, 10 hours after the accident.

   (a) How long was his foot 3 hours after the accident?

   (b) Find all times in the first 24 hours after the accident when his foot was 28.3 cm long. Express these times in hours after the accident.

4. Let

$$f(x) = \begin{cases} 3 - x & \text{if } x \geq 2 \\ 2 - \frac{1}{2}x & \text{if } x < 2 \end{cases}$$

and

$$g(x) = |x + 1|.$$

(a) (8 points) Write a multi-part rule for the function $h(x) = 3f(x) - g(x)$.

(b) (2 points) Is the function $h(x)$ one-to-one? Explain.