Math 120 A - Spring 2007
Mid-Term Exam Number Two
May 17, 2007

Name: ______________________________ Section: __________

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all questions.
- You may use a calculator during this examination. Other electronic devices are not allowed, and should be turned off 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.
- Show all work for full credit.
- You have 50 minutes to complete the exam.

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1. A probe lands on a distant planet at midnight. The temperature on the planet is a sinusoidal function of time. At midnight, the temperature was decreasing, and it continued decreasing until 5 AM, when the temperature reached the minimum, 20°C. The temperature then increased, reaching the maximum, 70°C at 4 PM.

   During the first 26 hours after the probe lands, for how much time was the temperature above 59°C?

2. A tree is growing in such a way that its height is always increasing but never grows above 120 feet tall. In 1998, the tree was 55 feet tall. In 2006, it was 78 feet tall. Assume that the tree's height is a linear-to-linear rational function of time. How many years after 1998 will the tree be 100 feet tall?

3. Malcolm is running around a circular track. The track's radius is 50 meters. Malcolm runs at a constant speed of 4 meters per second. If he runs for 32 seconds, how far, in a straight line, will he be from his starting point?

4. Let

$$f(x) = \begin{cases} 2x & \text{if } x < 5, \\ -5x & \text{if } x \geq 5 \end{cases}$$

and

$$g(x) = \begin{cases} -3x & \text{if } x < 0, \\ x - 2 & \text{if } 0 \leq x \leq 4, \\ -x & \text{if } x > 4 \end{cases}$$

Write the multipart rule for the function $h(x) = f(x) + g(x)$.