Math 120 A, B - Winter 2007
Mid-Term Exam Number Two
February 22, 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. Let $f(x) = |x + 2|$ and

$$g(x) = \begin{cases} 9x + 3 & \text{if } x \leq 1 \\ -3x + 15 & \text{if } x \geq 1. \end{cases}$$

Write the multipart rule for the function

$$h(x) = 2f(x) + g\left(\frac{1}{3}x\right).$$

2. A marine biologist is following a young bowhead whale in the Arctic ocean. She measures the weight of the whale to be 40 metric tons. Five years later, the whale's weight has grown to 60 metric tons. The whale's weight always increases, but never exceeds 90 metric tons.

Assume that the whale's weight is a linear-to-linear rational function of time. What will the whale's weight be 40 years after the initial measurement?

3. George and Paula start running from the westernmost point of a circular track. They start at the same time. Paula runs counterclockwise at 6.4 meters per second, and it takes her 69 seconds to run one lap of the track.

   (a) How far (in a straight line) is Paula from the southernmost point of the track after she has been running for 120 seconds?

   (b) George runs clockwise around the track. How fast does George have to run (in meters per second) so that he passes Paula, for the first time, after 47 seconds?

4. Fezilla is attacking. You must flee. But before you flee, you need to take some measurements to determine how tall Fezilla is.
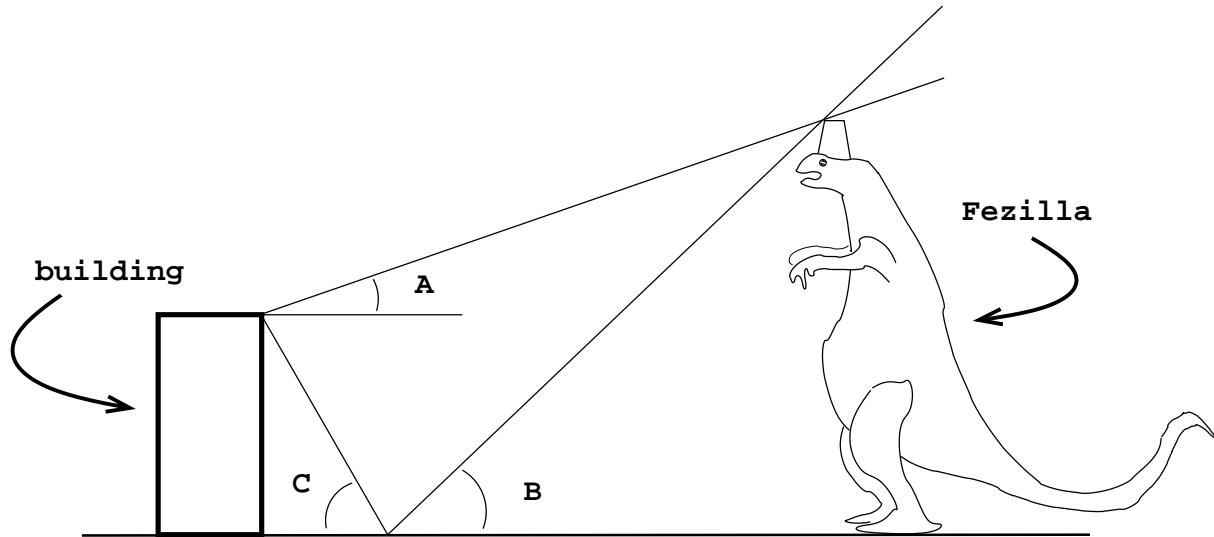
You make two measurements from the ground: angle B is $47°$ and angle C (to the top of a nearby building) is $73°$. From the top of the building, a comrade measures the angle A to be $25°$. The building is 80 meters tall.

How tall is Fezilla?