

Math 120 B and C - Autumn 2005
Mid-Term Exam Number Two
November 17, 2005

Name: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

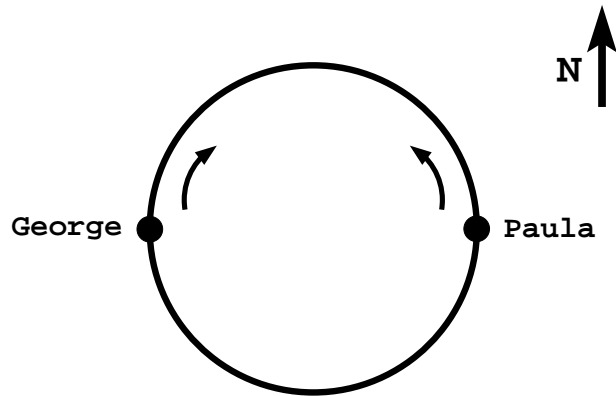
- Complete all questions.
- You may use a calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an 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.

1. Maria is climbing a vertical cliff wall.

Alice is observing Maria from a straight road that extends horizontally away from the base of the wall. Some distance away from the wall, Alice observes that from her position, Maria is 39 degrees above the horizontal. Alice moves 200 feet further away from the wall, and notices that Maria has climbed 12 feet higher. At this point Maria makes an angle of 35 degrees with the horizontal.

How high is Maria now?

2. George and Paula are running around a circular track. George starts at the westernmost point of the track, and Paula starts at the easternmost point. The illustration below shows their starting positions and running directions. They start running toward each other at constant speeds. George runs at 9 feet per second. Paula takes 50 seconds to run a lap of the track. George and Paula pass each other after 11 seconds.



After running for 3 minutes, how far east of his starting point is George?

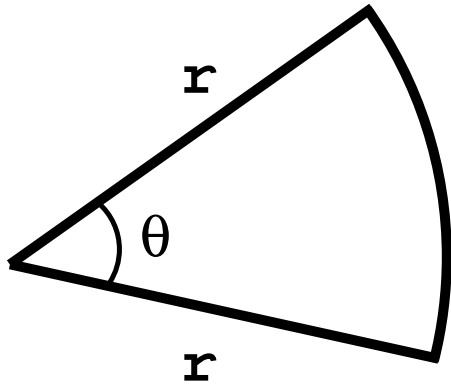
3. Over time, Frank's accuracy at the game of darts gets better and better. When Frank was 15 years old, he was only 74 percent accurate. When he was 25 years old, he was 90 percent accurate. Assume that his accuracy will always increase, and will approach arbitrarily close to 100 percent if he lives long enough.

Suppose Frank's accuracy percentage is a linear-to-linear function of his age.

How old will Frank be when he is 98 percent accurate?

4. Matilda is planning a walk around the perimeter of Wedge Park, which is shaped like a circular wedge, as shown below. The walk around the park is 2.1 miles, and the park has an area of 0.25 square miles.

If θ is less than 90 degrees, what is the value of the radius, r ?



5. Let $u(t)$ be the basic step function

$$u(t) = \begin{cases} 0 & \text{if } t < 0, \\ 1 & \text{if } 0 \leq t \leq 1, \\ 0 & \text{if } t > 1 \end{cases}$$

Write the multi-part rule for the function

$$g(t) = u(t - 5) + u(2t - 3) + 3t.$$