

Math 120 - Spring 2006  
Final Exam  
June 3, 2006

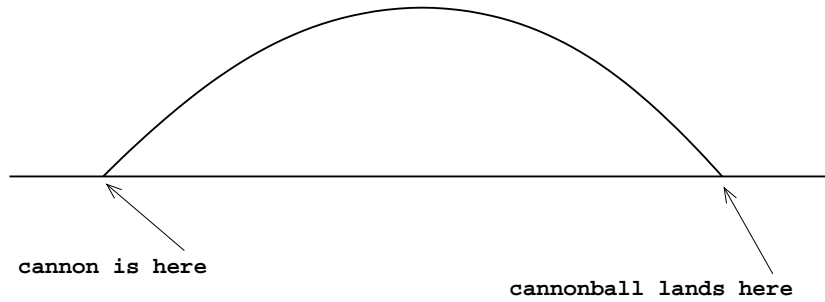
Name: \_\_\_\_\_

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

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
Total	70	

- 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 170 minutes to complete the exam.

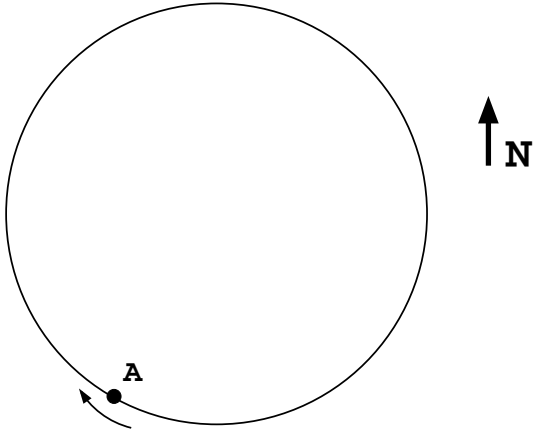
1. A cannon fired a cannonball in a parabolic arc across a horizontal field. The cannonball landed 1300 feet away from the cannon, and reached a maximum height of 350 feet.



If there had been a wall 850 feet away from the cannon, with a height of 300 feet, would the cannonball have flown over it, or would it have hit the wall? Explain.

Assume the cannonball leaves the cannon at a height of zero, i.e. at the same level as the field.

2. Margot is cycling around a circular track at 20 meters per second, starting at point A and moving in the direction indicated.



She takes 7.2 seconds to reach the westernmost point of the track.

She takes 36.5 seconds to reach the southernmost point of the track.

How far (in a straight line) will she be from her starting point after cycling for 5 minutes?

3. Circular Forest is shaped like a circle with a radius of 7 km. Tia is going to take a hike in a straight line starting from a point 5 km east and 6 km north of the easternmost point of Circular Forest. She will walk to a point 8 km west and 8 km south of the center of the forest.

For what distance will she be walking in the forest?

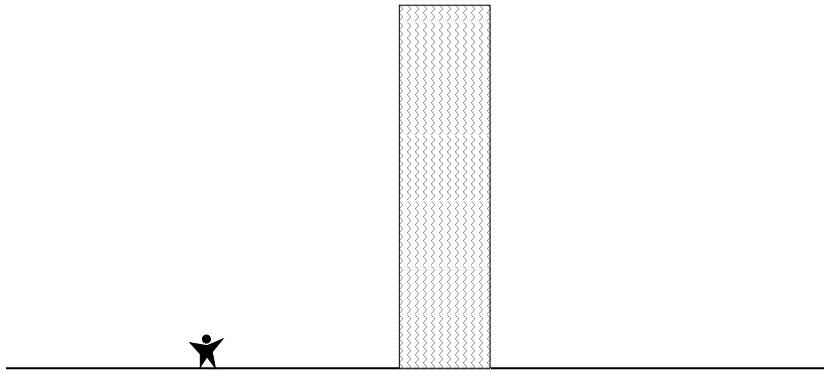
4. Two cities, A and B, have populations that are growing exponentially. Initially, the population of B is twice that of A, but ten years later they are equal. If it takes 60 years for B's population to double, how long does it take A's population to double?

5. The population of the island of Corbina was 1,000 in the year 1980, 2,000 in the year 1990, and 2,500 in the year 2000.

(a) Give a linear-to-linear rational function model of this population.

(b) According to your model, can the population ever reach 3,500? If so, in what year? If not, explain why not.

6. You are interested in determining the height of a tall building. You measure its angle of elevation at one point to be  $76^\circ$ . You then move 70 feet closer to the building and measure the angle of elevation again; this time it is  $87^\circ$ .



How tall is the building?

7. Write the multipart rule for the function  $f(x) = |x^2 - 4| + |x - 1|$ .