

Math 120 A - Spring 2009  
Mid-Term Exam Number One  
April 23, 2009

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

Student ID no. : \_\_\_\_\_

Signature: \_\_\_\_\_

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

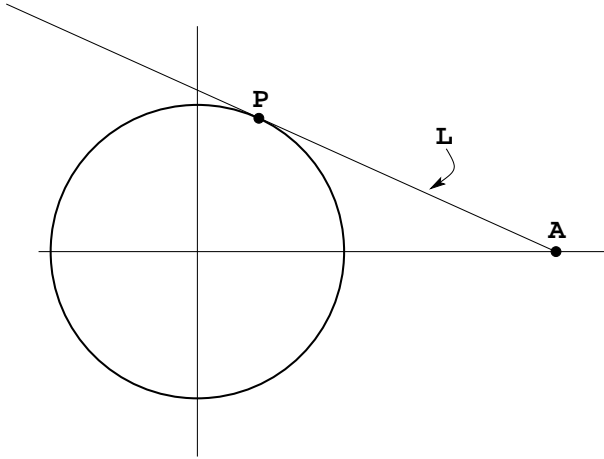
1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.
- You may use a scientific calculator during this examination. Graphing calculators are not allowed. Also, 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 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.

1. Carlos is hiking near the Circular Forest, a forest in the shape of a perfect circle. The forest has a radius of 9 km. Carlos begins hiking from a point 14 km WEST and 7 km SOUTH of the center of the forest. He begins hiking DUE EAST, but when he reaches the edge of the forest, he turns and hikes NORTH. He hikes NORTH for 5 km, then turns and hikes WEST until he leaves the forest.

Carlos hikes at a constant 4 km per hour. How much time did he spend in the forest?

2. In the figure below, the circle is centered at the origin. The line  $L$  is tangent to the circle: it intersects the circle at exactly one point,  $P$ . The line  $L$  also passes through the point  $A$ .



If the circle has a radius of 11, and  $A$  is the point  $(26, 0)$ , find the coordinates of point  $P$ .

- Alice has a peach orchard. She knows from past experience that the number of kilograms of peaches produced per tree is a linear function of the number of trees in the orchard. If she has 100 trees, the trees will produce 96 kg of peaches per tree. Reducing the number of trees by 10 will increase the kilograms produced per tree by 8.

What is the maximum possible total number of kilograms of peaches her orchard can produce?

4. (a) (5 points) Let  $g(x) = |x - 3| - \frac{1}{2}x$ . Find all solutions to the equation

$$g(x) = 2 - 5x$$

(b) (5 points) Let  $f(x) = 8x - 7$ . Find a function  $h(x)$  such that  $h(h(x)) = f(x)$ .