

Math 120 A Spring 2018
Mid-Term Exam Number One
April 19, 2018

Name: _____

Student ID no. : _____

Signature: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.
- Show all work for full credit.
- The only calculator you may use during this exam is a TI-30XIIs. All 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, two-sided, hand-written 8.5 by 11 inch page of notes. Write your name on your notesheet and turn it in with your exam.
- You have 50 minutes to complete the exam.

1. You start bicycling from a point 33 meters due EAST of a fountain in a park and bicycle directly toward a point 56 meters due NORTH of the fountain. You bicycle at a constant speed of 13 meters per second.

(a) Impose a coordinate system with the fountain at the origin. Give the parametric equations for your location t seconds after you start bicycling.

(b) A bear starts moving at the same time that you do. t seconds after you start walking, the bear's location is given by $x = 1 + 3t, y = 60 - 4t$.

Find the value of t when you are closest to the bear.

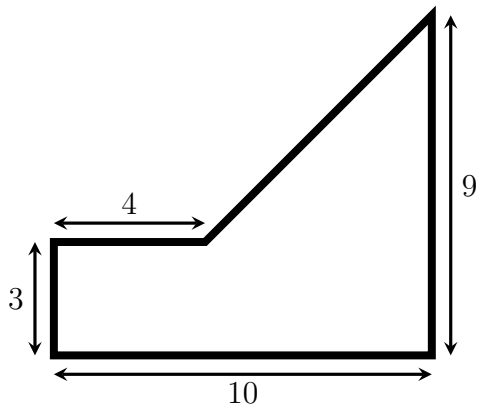
2. You are walking near the Circular Forest, which has the shape of a perfect circle with a radius of 15 km.

You begin your walk 20 km WEST and 5 km SOUTH of the center of the forest and walk directly toward the easternmost point of the forest. You walk at a constant speed of 5 km/hr.

How much time passes from the moment you enter the forest until you are at the point where you are closest to the center of the forest?

3. You have a pizza shaped as shown in the figure below (dimensions are in centimeters). You are going to make a vertical cut through the pizza. The cut will be located a distance x centimeters from the left edge.

Express the area of the pizza to the left of the cut as a multipart function of x .



4. (a) Let

$$f(x) = \begin{cases} 3x + 1 & \text{if } x \geq 1, \\ 1 - x & \text{if } x < 1. \end{cases}$$

Find all values of c such that $f(c) = c$.

(b) Let $g(x) = 2x^2 - 3x$. Simplify the expression

$$\frac{g(x+h) - g(x-h)}{h}$$

far enough so that plugging in $h = 0$ would be allowed.