Math 120 A, B - Winter 2011
Mid-Term Exam Number One
January 27, 2011

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.

- You may use a scientific calculator during this examination. Graphic 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.

- You have 50 minutes to complete the exam.

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1. Josephine is sailing near a radar buoy which can detect anything within 8 km of the buoy. She starts sailing from a point 7 km WEST and 9 km SOUTH of the buoy. She sails NORTH for one hour, then turns and sails EAST for 30 km.

   She sails at a constant speed of 6 km/hr.

   How much time was she within 8 km of the buoy?

2. You are going to cut a pizza which is shaped as shown below.

one possible cut

5

5

P

10
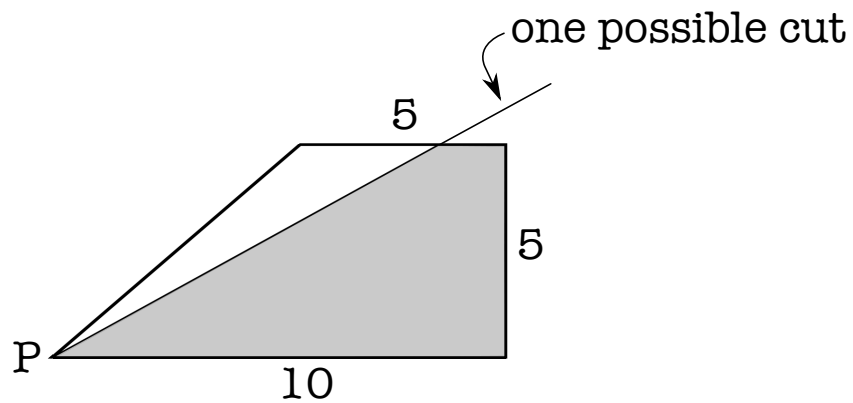
You wish to make a straight cut through the lower left corner, labeled P. We are interested in the area below the cut, which is shaded in the figure.

Impose a coordinate system with P at the origin.

(a) If the cut has a slope of 0.6, what is the area of the pizza below the cut?

(b) Suppose the cut has slope m. Write the area of the pizza below the cut as a multipart function of m.

3. Jo is moving linearly in the xy-plane at a constant speed. She starts from the point $(3, 1)$ and moves along the line $y = -3x + 10$ at a speed of 2 units per second, heading toward the y-axis.

(a) Write parametric equations for Jo's location t seconds after starting.

(b) Express Jo's distance from the point $(5, 8)$ as a function of t.

4. Let $f(x) = x^2 - 3x$ and $g(x) = |x + 3|$

(a) Simplify the expression
$$\frac{f(x - h) - f(x + 2h)}{h}$$
far enough so that plugging in $h = 0$ would be allowed.

(b) Find all solutions to the equation
$$g(x) = -2x - 8.$$