

Math 120  
Exam 1  
October 2025

Name \_\_\_\_\_

Student ID # \_\_\_\_\_

Section \_\_\_\_\_

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

SIGNATURE: \_\_\_\_\_

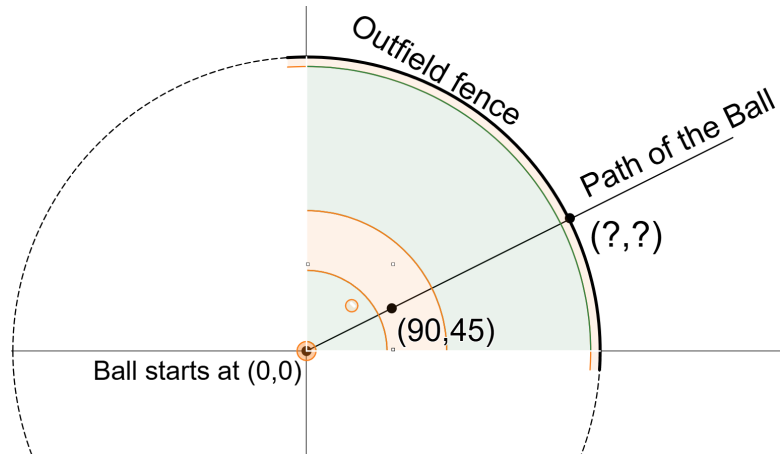
- This exam consists of this cover, four pages of questions, and a blank scratch page.
- You will have 50 minutes.
- You may use a Ti-30x IIS calculator (no other models) and one 8.5×11 inch sheet of handwritten notes (front and back).
- Turn your cell phone OFF and put it away for the duration of the exam. You may not listen to headphones or earbuds during the exam.
- **You must show your work.** Correct answers with no supporting work may receive no credit.
- Leave answers in exact form or round to three digits after the decimal, unless otherwise specified.
- **Do not write within 1 cm of the edge.** Exams are scanned for grading.
- There may be multiple versions. Do not cheat. If your answer matches another version with no supporting work, you will receive a zero and be reported.
- Alternate text for any image is given at the bottom of the page where the image appears.

GOOD LUCK!

1. (10 pts) A baseball is hit toward the outfield fence along a straight line (as viewed from above) and is traveling at a constant speed of 120 ft/sec. The ball starts at  $(0,0)$  and passes through the point  $(90,45)$ , eventually going over the outfield fence. The outfield fence is part of a circle of radius 300 feet centered at  $(0,0)$ . All distances are in feet.

A picture of this situation is shown.

Find the  $(x,y)$  location at which the ball passes over the fence and find how long it takes for the ball to get to the fence.



(round to 1 digit after the decimal) Location:  $(x,y) \approx$  \_\_\_\_\_

Time = \_\_\_\_\_ seconds

*Alt text for image: A circle of radius 300 and a line through  $(0,0)$  and  $(90,45)$ .*

2. (15 pts)

(a) Julio runs in a straight line from  $(0, 0)$  to  $(8, 12)$  at a constant speed. He reaches the point  $(8, 12)$  in 6 seconds. Cal stands at the point  $(0, 4)$ .

(i) (6 pts) Find the  $(x, y)$  location on Julio's path where he is closest to Cal.  
(*Hint: perpendicular*)

Closest location:  $(x, y) \approx$  \_\_\_\_\_

(ii) (4 pts) Give the parametric equations for Julio's location at time  $t$  seconds and determine how long it takes Julio to get to the point from the previous part.

$x(t) =$  \_\_\_\_\_,  $y(t) =$  \_\_\_\_\_

time to reach closest point:  $t \approx$  \_\_\_\_\_ seconds

(b) (5 pts) Let  $g(x) = 4x - 3 + |x + 5|$ . Find the valid value(s) of  $x$  that satisfy  $g(x) = 2x - 10$ .

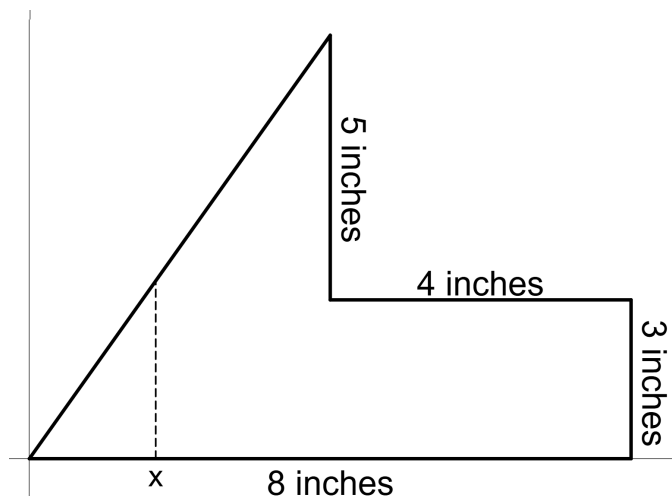
Value(s) of  $x =$  \_\_\_\_\_

3. (15 pts)

- (a) (5 pts) Given  $f(x) = 4x - 2x^2$ , find and **completely simplify**  $\frac{f(x+h) - f(x)}{h}$ .

Simplified expression = \_\_\_\_\_

- (b) (10 pts) T-Mobile park has decided to sell unusually shaped pizzas. One of the designs is shown below. A vertical cut is made  $x$  inches from the left edge. Express the area,  $A(x)$ , of the region to the left of the cut as a multi-part function of  $x$ .

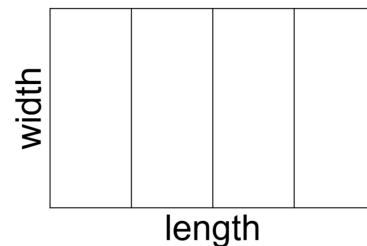


Fill in the blanks below to give your answer:

$$A(x) = \begin{cases} \text{_____} & \text{if } \text{_____} \leq x \leq \text{_____}; \\ \text{_____} & \text{if } \text{_____} < x \leq \text{_____}. \end{cases}$$

Alt text for image: A polygon with corners at (0,0), (4,8), (4,3), (8,3), and (8,0).

4. (10 pts) The Mariners are building a batting cage. They have 910 feet of fencing and plan to create a large rectangular enclosure with three equally spaced dividing walls (as shown). Find the dimensions that maximize the total enclosed area and give the maximum area.



Width = \_\_\_\_\_ ft,    Length = \_\_\_\_\_ ft

Maximum Area = \_\_\_\_\_ ft<sup>2</sup>

*Alt Text for image: Rectangle with three equally spaced interior vertical lines.*

You may use this page for scratch work or extra space.

**All work on this page will be ignored** unless you write and circle “see scratch page” on the problem page and label your work below.