Math 120 A Winter 2025 Midterm I January 28, 2025

Name_____

Student Number_____

Instructions

- These exams will be scanned. Please write your name and student number clearly.
- There are 4 questions. The exam is out of 50 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. No printed material allowed. Hand in your notes with your exam.
- You can only use a Ti-30x IIS calculator. Unless otherwise stated, you have to give exact answers to questions. ($\frac{2}{\pi}$ and 1/3 are exact, 0.6366 and 0.333 are approximations for those numbers.)
- Show your work. If we cannot read or follow your work, we cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work.

- 1. As soon as I take my dog off his leash, he starts running North at 2.5 meters per second. At 5 seconds, he spots a rabbit and turns right and increases his speed to 4 meters per second to catch the rabbit. The rabbit disappears, of course, and at 12.5 seconds I call him back and he runs towards me at 2.6 meters per second.
 - (a) Make a sketch of his path on the right putting me at the origin.
 - (b) When does he reach me and what is the total distance he has run?

(c) Write down my dog's distance from me (in meters) as a multi-part function in terms of t (in seconds). Hint: How many parts are there? Which ones are linear?

(d) At what times is he exactly 10 meters away from me? Round your answer to two digits after the decimal point.

			30			
			20-			
			10			
-30	-20	- 10	0	10	20	30
			-10			
			-20			
			20			

- 2. Gig Harbor is 25 miles South and 10 miles West of Seattle. Sultan is 20 miles North and 20 miles East of Seattle. Amelia is flying from Gig Harbor to Sultan in a straight line at 130 miles per hour. At the same altitude as her flight path, there is a cloud of radius 8 miles with center in Seattle.
- (a) Sketch the cloud and her flight path where Seattle is at the origin.
- (b) How long does she spend in the cloud? Give your answer in minutes rounded to the first digit after the decimal.

			30			
			20-			
			10			
-30	-20	- 10	0	10	20	30
			-10-			
			-20-			
			- 30			

(c) What is her shortest distance to Seattle? Round your answer to two digits after the decimal.

3. Let $f(x) = 2x^2 - 10x$. Simplify the expression

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

as much as you can and then evaluate it at h = 0.

- 4. Let $f(x) = \left|\frac{x}{2} + 3\right|$ and g(x) = 3x + 1. (a) Solve f(x) = g(x) using algebra.

- 30 20 10-0 -30 -20 -10 10 20 30 -10 -20--30
- (b) Graph both on the axes below and see that your algebraic solution is correct.

This page is empty. You can use it for scratch work. If you continue a question here and want it graded, make a note on the question page so we will look.