Math 120 Section **Midterm I, January 26th** **Winter 2023**

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.

Name

Signature

Student ID #

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10	10	10	30

- You have 50 minutes for 3 problems. Check your copy of the exam for completeness.
- You are allowed to use a hand written sheet of paper (8x11 in), back and front.
- Calculator : TI 30 X.
- Justify all your answers and show your work for credit.
- All answers must be exact, no rounding.

Do not open the test until everyone has a copy and the start of the test is announced.

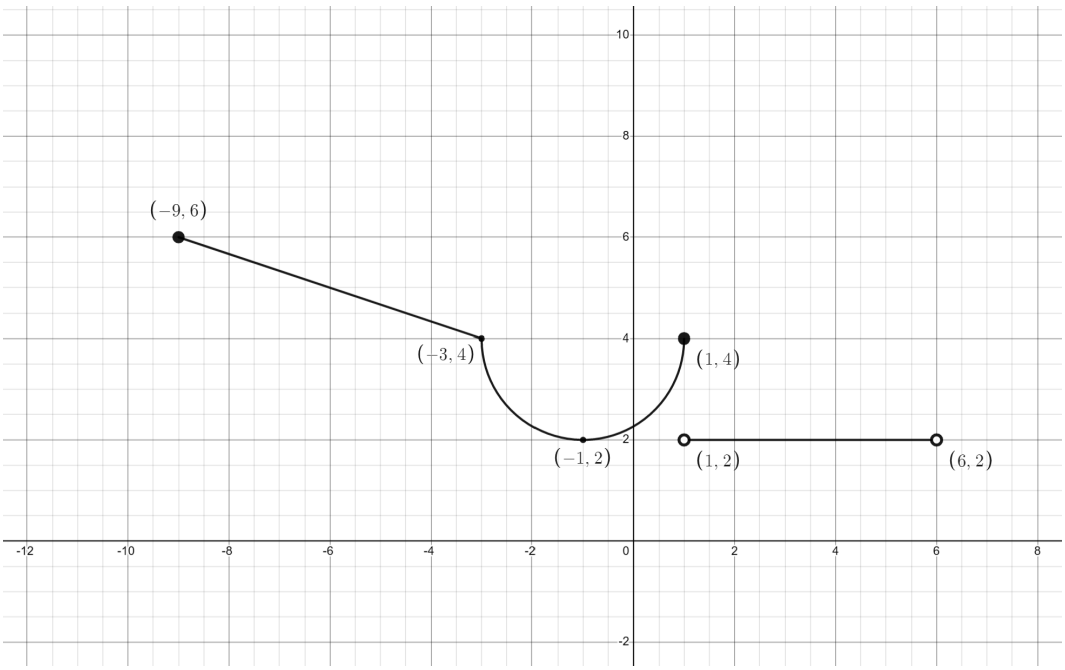
GOOD LUCK!

Problem 1. Consider the function $f(x) = |x + 1|$.

(a) Solve the equation $f(x) = 2x + 1$.

(b) Interpret the answer in (a) in the xy-coordinate system using compete sentences. In other words, what would you see at the position of x you found in (a)?

Problem 2. Consider the following graph of the function $f(x)$.



(a) Find the domain of the function in interval notation.

(b) Write the rule for this multipart function.

(c) In the given coordinate system clearly mark the y-intercept of the graph.

(d) Does the function have x-intercepts? Explain your answer.

(e) Find the range of the function in interval notation.

(f) Does $f(x) = x$ have a solution? You may use the graph to explain your answer.

(g) Is $f(1) = 2$? Explain your answer.

Problem 3. A motion sensor detects all motions around it within 10 feet from its location. Impose a coordinate system whose origin is the location of the detector. A fox trots on a straight line toward the detector, enters the detection zone at $(10, 0)$ and exits it at $(-8, 6)$. Do **not round** in this problem. Do not forget **units in your final answer**.

(a) What distance did the fox cover within the detection zone?

(b) If the speed of the fox is $2\frac{\text{ft}}{\text{s}}$, how long will he be in the detection zone?

(c) What is the closest distance of the fox from the sensor?

(d) Would a rabbit sitting at $(3, -9)$ be detected by the sensor? Explain your answer.