

Math 120 Problems

Chapter 6

1. (a) Let $f(x) = x + |2x - 1|$. Find all solutions to the equation

$$f(x) = 8$$

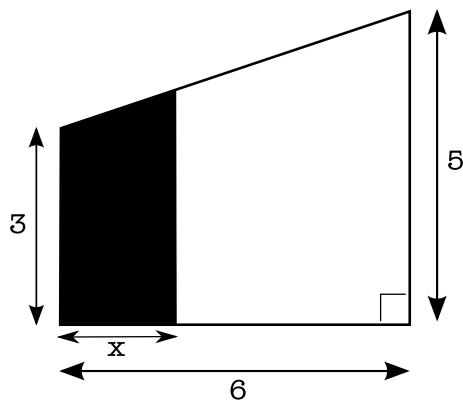
- (b) Let $g(x) = 3x - 3 + |x + 5|$. Find all values of a which satisfy the equation

$$g(a) = 2a + 8.$$

- (c) Let $h(x) = |x| - 3x + 4$. Find all solutions to the equation

$$h(x - 1) = x - 2.$$

2. Express the area of the shaded region below as a function of x . The dimensions in the figure are centimeters.



3. Arthur is going for a run. From his starting point, he runs due east at 10 feet per second for 250 feet. He then turns, and runs north at 12 feet per second for 400 feet. He then turns, and runs west at 9 feet per second for 90 feet.

Express the (straight-line) distance from Arthur to his starting point as a function of t , the number of seconds since he started.

Chapter 7

1. Sketch the graph of the function $f(x) = x^2 - 3x + 4$ on the interval $-3 \leq x \leq 5$. What is the maximum value of $f(x)$ on that interval? What is the minimum value of $f(x)$ on that interval?
2. Sketch the graph of the function $f(x) = x^2 - 3x + 4$ on the interval $2 \leq x \leq 6$. What is the maximum value of $f(x)$ on that interval? What is the minimum value of $f(x)$ on that interval?
3. Sketch the graph of the function $g(x) = -(x + 3)^2 + 3$ on the interval $0 \leq x \leq 7$. What is the maximum value of $g(x)$ on that interval? What is the minimum value of $g(x)$ on that interval?

Chapter 10

1. Write the multipart rule and sketch the following functions.

(a) $j(x) = x - |2x - 6|$

(b) $g(x) = |x| + |x - 2| + |x - 5|$

(c) $h(x) = x|3 - x|$

Chapter 15

1. Marla is running clockwise around a circular track. She runs at a constant speed of 3 meters per second. She takes 46 seconds to complete one lap of the track. From her starting point, it takes her 12 seconds to reach the northernmost point of the track.

Impose a coordinate system with the center of the track at the origin, and the northernmost point on the positive y -axis.

(a) Give Marla's coordinates at her starting point. (Ans.: (-21.91218, -1.498834))

(b) Give Marla's coordinates when she has been running for 10 seconds. (Ans.: (-5.92564, 21.14892))

(c) Give Marla's coordinates when she has been running for 901.3 seconds. (Ans.: (19.07064, -10.89497))

2. Shirley is on a ferris wheel which spins at 3.2 revolutions per minute. The wheel has a radius of 45 feet, and the center of the wheel is 59 feet above the ground.

After the wheel starts moving, Shirley takes 16 seconds to reach the top of the wheel.

How high above the ground is she when the wheel has been moving for 9 minutes? (Ans.: 101.49693666 feet above the ground)

3. Charlie and Alexandra are running around a circular track with radius 60 meters. Charlie started at the westernmost point of the track, and, at the same time, Alexandra started at the northernmost point. They both run counterclockwise. Alexandra runs at 4 meters per second, and will take exactly 2 minutes to catch up to Charlie.

Impose a coordinate system, and give the x - and y -coordinates of Charlie after one minute of running. (Ans.: With the center of the track at the origin, and the northernmost point on the positive y -axis: (59.84016, 4.37666))