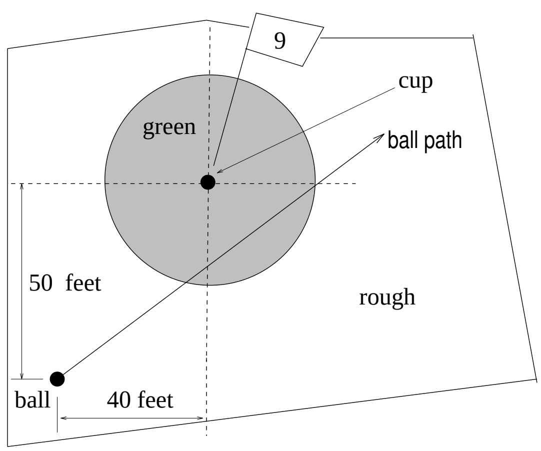
Equation	**Slope**	**y-intercept**	**Point on the line**	**Point on the line**
$y = 2x + 1$				
			$(3, -4)$	$(-1, 7)$
	-2	1		
	$\frac{1}{2}$		$(0, 1)$	
		$1{,}000$		
	0			
			$(3, 3)$	$(3, -2)$
			$(5, -9)$	

Table 4.2: Linear equations table for Problem 4.4.



The ball follows a straight line path and exits the green at the right-most edge. Assume the ball travels a constant rate of 10 ft/sec.

(a) Where does the ball enter the green?

(b) When does the ball enter the green?

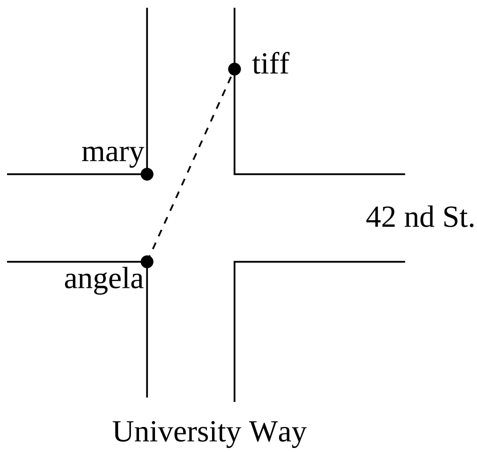
(c) How long does the ball spend inside the green?

(d) Where is the ball located when it is closest to the cup and when does this occur.

Problem 4.7. Allyson and Adrian have decided to connect their ankles with a *bungee cord*; one end is tied to each person's ankle. The cord is 30 feet long, but can stretch up to 90 feet. They both start from the same location. Allyson moves 10 ft/sec and Adrian moves 8 ft/sec in the directions indicated. Adrian stops moving at time $t = 5.5$ sec, but Allyson keeps on moving 10 ft/sec in the indicated direction.

(a) Sketch an accurate picture of the situation at time $t = 7$ seconds. Make sure to label the locations of Allyson and Adrian; also, compute the length of the bungee cord at $t = 7$ seconds.

(b) Where is Allyson when the bungee reaches its maximum length?

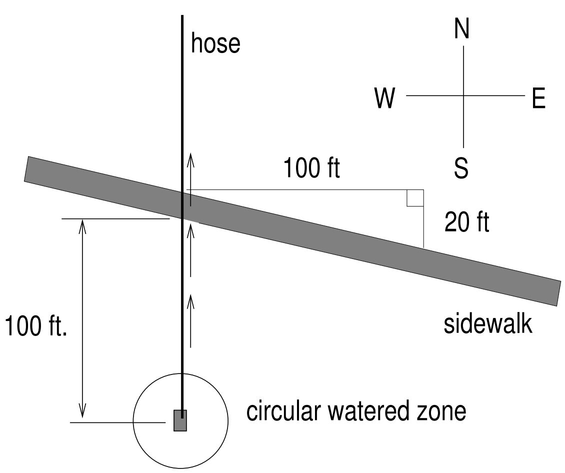


Problem 4.12. The infamous *crawling tractor sprinkler* is located as pictured below, 100 feet South of a 10 ft. wide sidewalk; notice the hose and sidewalk are not perpendicular. Once the water is turned on, the sprinkler waters a circular disc of radius 20 feet and moves North along the hose at the rate of $\frac{1}{2}$ inch/second.

(a) Impose a coordinate system. Describe the initial coordinates of the sprinkler and find the equation of the line forming the southern boundary of the sidewalk.

(b) After 33 minutes, sketch a picture of the wet portion of the sidewalk; find the length of the wet portion of the Southern edge of the sidewalk.

(c) Find the equation of the line forming the northern boundary of the sidewalk. (Hint: You can use the properties of right triangles.)



Problem 4.13. Margot is walking in a straight line from a point 30 feet due east of a statue in a park toward a point 24 feet due north of the statue. She walks at a constant speed of 4 feet per second.

(a) Write parametric equations for Margot's position t seconds after she starts walking.

(b) Write an expression for the distance from Margot's position to the statue at time t.

(c) Find the times when Margot is 28 feet from the statue.

Problem 4.14. Juliet and Mercutio are moving at constant speeds in the xy-plane. They start moving at the same time. Juliet starts at the point $(0, -6)$ and heads in a straight line toward the point $(10,5)$, reaching it in 10 seconds. Mercutio starts at $(9, -14)$ and moves in a straight line. Mercutio passes through the same point on the x axis as Juliet, but 2 seconds after she does.

How long does it take Mercutio to reach the y-axis?

Problem 4.15. (a) Solve for x:

$$\frac{1}{x} - \frac{1}{x+1} = 3.$$

(b) Solve for t: $2 = \sqrt{(1+t)^2 + (1-2t)^2}$.

(c) Solve for t: $\frac{3}{\sqrt{5}} = \sqrt{(1+t)^2 + (1-2t)^2}$.

(d) Solve for t: $0 = \sqrt{(1+t)^2 + (1-2t)^2}$.

Problem 4.16. (a) Solve for x:

$$x^4 - 4x^2 + 2 = 0$$

(b) Solve for y:

$$y - 2\sqrt{y} = 4$$