

EXERCISES P.1

In Exercises 1–2, express the given rational number as a repeating decimal. Use a bar to indicate the repeating digits.

1. $\frac{2}{9}$

2. $\frac{1}{11}$

In Exercises 3–4, express the given repeating decimal as a quotient of integers in lowest terms.

3. $0.\overline{12}$

4. $3.\overline{27}$

5. Express the rational numbers $1/7$, $2/7$, $3/7$, and $4/7$ as repeating decimals. (Use a calculator to give as many decimal digits as possible.) Do you see a pattern? Guess the decimal expansions of $5/7$ and $6/7$ and check your guesses.

6. Can two different decimals represent the same number? What number is represented by $0.999\ldots = 0.\overline{9}$?

In Exercises 7–12, express the set of all real numbers x satisfying the given conditions as an interval or a union of intervals.

7. $x \geq 0$ and $x \leq 5$

8. $x < 2$ and $x \geq -3$

9. $x > -5$ or $x < -6$

10. $x \leq -1$

11. $x > -2$

12. $x < 4$ or $x \geq 2$

In Exercises 13–26, solve the given inequality, giving the solution set as an interval or union of intervals.

13. $-2x > 4$

15. $5x - 3 \leq 7 - 3x$

17. $3(2 - x) < 2(3 + x)$

19. $\frac{1}{2-x} < 3$

21. $x^2 - 2x \leq 0$

23. $x^3 > 4x$

25. $\frac{x}{2} \geq 1 + \frac{4}{x}$

14. $3x + 5 \leq 8$

16. $\frac{6-x}{4} \geq \frac{3x-4}{2}$

18. $x^2 < 9$

20. $\frac{x+1}{x} \geq 2$

22. $6x^2 - 5x \leq -1$

24. $x^2 - x \leq 2$

26. $\frac{3}{x-1} < \frac{2}{x+1}$

Solve the equations in Exercises 27–32.

27. $|x| = 3$

28. $|x - 3| = 7$

29. $|2t + 5| = 4$

30. $|1 - t| = 1$

31. $|8 - 3s| = 9$

32. $\left|\frac{s}{2} - 1\right| = 1$

In Exercises 33–40, write the interval defined by the given inequality.

33. $|x| < 2$

34. $|x| \leq 2$

35. $|s - 1| \leq 2$

36. $|t + 2| < 1$

37. $|3x - 7| < 2$

38. $|2x + 5| < 1$

39. $\left|\frac{x}{2} - 1\right| \leq 1$

40. $\left|2 - \frac{x}{2}\right| < \frac{1}{2}$

In Exercises 41–42, solve the given inequality by interpreting it as a statement about distances on the real line.

41. $|x + 1| > |x - 3|$

42. $|x - 3| < 2|x|$

43. Do not fall into the trap $|-a| = a$. For what real numbers a is

this equation true? For what numbers is it false?

44. Solve the equation $|x - 1| = 1 - x$.

45. Show that the inequality

$$|a - b| \geq ||a| - |b||$$

holds for all real numbers a and b .

P.2

In Exercises 13–14, find an equation for (a) the vertical line and (b) the horizontal line through the given point.

13. $(-2, 5/3)$

14. $(\sqrt{2}, -1.3)$

In Exercises 15–18, write an equation for the line through P with slope m .

15. $P(-1, 1)$, $m = 1$

16. $P(-2, 2)$, $m = 1/2$

17. $P(0, b)$, $m = 2$

18. $P(a, 0)$, $m = -2$

In Exercises 19–20, does the given point P lie on, above, or below the given line?

19. $P(2, 1)$, $2x + 3y = 6$

20. $P(3, -1)$, $x - 4y = 7$

In Exercises 21–24, write an equation for the line through the two points.

21. $(0, 0)$, $(2, 3)$

22. $(-2, 1)$, $(2, -2)$

23. $(4, 1)$, $(-2, 3)$

24. $(-2, 0)$, $(0, 2)$

In Exercises 25–26, write an equation for the line with slope m and y -intercept b .

25. $m = -2$, $b = \sqrt{2}$

26. $m = -1/2$, $b = -3$

In Exercises 27–30, determine the x - and y -intercepts and the slope of the given lines, and sketch their graphs.

27. $3x + 4y = 12$

28. $x + 2y = -4$

29. $\sqrt{2}x - \sqrt{3}y = 2$

30. $1.5x - 2y = -3$

In Exercises 31–32, find equations for the lines through P that are (a) parallel to and (b) perpendicular to the given line.

31. $P(2, 1)$, $y = x + 2$

32. $P(-2, 2)$, $2x + y = 4$

33. Find the point of intersection of the lines $3x + 4y = -6$ and $2x - 3y = 13$.

34. Find the point of intersection of the lines $2x + y = 8$ and $5x - 7y = 1$.

35. (Two-intercept equations) If a line is neither horizontal nor vertical and does not pass through the origin, show that its equation can be written in the form $\frac{x}{a} + \frac{y}{b} = 1$, where a is its x -intercept and b is its y -intercept.

36. Determine the intercepts and sketch the graph of the line $\frac{x}{2} - \frac{y}{3} = 1$.

37. Find the y -intercept of the line through the points $(2, 1)$ and $(3, -1)$.