

- b. Looking at the graphs, we see that the graph of the absolute value is above the line $y = 8$ on the intervals $(-\infty, -1.5)$ and $(6.5, \infty)$. Thus, the interval $(-\infty, -1.5) \cup (6.5, \infty)$ is the solution set for $|2x - 5| > 8$.

Now work margin exercise 4.

Margin Exercise Answers

1. $x \approx 4.06$ 2. $x = -1$ and $x \approx 0.33$ 3. $x = 1$ and $x \approx 3.67$ 4. a. $(1, 3.67)$ b. $(-\infty, 1) \cup (3.67, \infty)$

6.8 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

- The _____ of a function are the values of x at the points where the graph of the function crosses the x -axis.
- If a factor of a function occurs twice, we say that the corresponding zero is of multiplicity _____.
- If the graph is not fully visible on the screen of a graphing calculator, you must update the _____ setting.
- Cubic functions have _____ distinct zeros, _____ distinct zeros, or 1 distinct zero.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- To find the zeros of a function, we determine where $x = 0$.
- A nonconstant linear function can have at most two zeros.
- Quadratic functions have 2 distinct zeros or none.
- The trace command on a graphing calculator will find exact solutions.

Practice

Use a graphing calculator to solve (or estimate the solutions of) each equation. Find any approximations accurate to the nearest hundred. See Examples 1 through 3.

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|--------------------|--------------------------|---------------------------|
| 1. $x^2 - 4 = 0$ | 7. $x^2 + 2x - 11 = 0$ | 13. $3x^2 - 9 = x$ |
| 2. $x^2 - 9 = 0$ | 8. $3x^2 - x - 6 = 0$ | 14. $x^3 = 2x^2 - 5$ |
| 3. $x^2 - 2 = 0$ | 9. $-x^2 + 3x + 8 = 0$ | 15. $5x - 3 = x^3$ |
| 4. $x^2 - 15 = 0$ | 10. $-2x^2 + 4x - 5 = 0$ | 16. $x^3 + 2x^2 = 4x + 6$ |
| 5. $x^2 - 4x = 12$ | 11. $2x^2 + x + 2 = 0$ | 17. $x(x-1)(x-3) = 0$ |
| 6. $x^2 + 6x = 7$ | 12. $3x + 15 = x^2$ | 18. $(x-2)(x+1)(x+4) = 0$ |

19. $(x+3)(x+1)(x-5) = 0$

20. $(x+2)(x-1)(x-6) = 0$

21. $2x^3 - 8x^2 + 7x - 1 = 9$

22. $3x^3 - x^2 + 4 = 10$

23. $-x^3 + 4x^2 - x = 5$

24. $x^4 - 10x^2 = 0$

25. $x^4 = 3x^2$

26. $x^4 - x^3 + 2x = 0$

27. $x^2 = \frac{1}{12}x - 5$

28. $|2x - 3| = 11$

29. $|2x + 1| = 7$

30. $|3x - 2| = 7$

31. $|4x + 1| = 19$

32. $|2x + 1| = |x - 1|$

33. $|x - 3| = |x + 2|$

34. $\left|\frac{x}{2} + 1\right| = \frac{3}{2}$

35. $\left|\frac{x}{5} - 1\right| = |x|$

36. $|x - 2| = |5 - x|$

37. $\left|-3x + \frac{1}{2}\right| = \frac{2}{3}$

38. $|0.7x + 3| - 11 = -10$

39. $\left|-\frac{1}{2}x - 5\right| = 43$

40. $|7x + 1| = -2$

Use a graphing calculator to solve (or estimate the solutions of) each inequality. Write your answers in interval notation. See Example 4.

41. $|x| > 6$

42. $|x| \leq 3$

43. $|x - 3| \leq 1$

44. $|x - 5| > 2$

45. $|x - 4| \geq 2$

46. $|3x - 8| > 4$

47. $|x + 2| - 10 \leq 17$

48. $|x - 4| - 2 > 10$

49. $\left|\frac{x}{3} - 1\right| < 2$

50. $\left|\frac{x}{4} + 3\right| \geq 1$

51. $\left|-\frac{1}{2}x - 3\right| > 5$

52. $|-2(x + 1) + 3| < 20$

Writing & Thinking

53. Use a graphing calculator and three graphs to solve the inequality $1 \leq |x - 4| \leq 5$.

Write the answer in interval notation. Explain how you might solve this inequality algebraically.

54. Explain algebraically and graphically (using a graphing calculator) why the inequality $|2x + 1| < -5$ has no solution.