SECTION 2.3 Quadratic Functions and Their Z

9. How many real zeros can a quadratic function have?

10. State the quadratic formula.

11. *True or False* If the discriminant of a quadratic equation is positive, then the equation has two solutions that are negatives of one another.

12. A quadratic equation is sometimes called a _____
(a) first-degree   (b) second-deg
(c) third-degree   (d) fourth-degi

Skill Building

In Problems 13–26, find the zeros of each quadratic function by factoring. What are the x-intercepts of the graph of the functi

13. $f(x) = x^2 - 9x$

14. $f(x) = x^2 + 4x$

15. $g(x) = x^2 - 25$

16. $G(x) = x^2 -$

17. $F(x) = x^2 + x - 6$

18. $H(x) = x^2 + 7x + 6$

19. $g(x) = 2x^2 - 5x - 3$

20. $f(x) = 3x^2 +$

21. $P(x) = 3x^2 - 48$

22. $H(x) = 2x^2 - 50$

23. $g(x) = x(x + 8) + 12$

24. $f(x) = x(x -$

25. $G(x) = 4x^2 + 9 - 12x$

26. $F(x) = 25x^2 + 16 - 40x$

In Problems 27–32, find the zeros of each quadratic function using the Square Root Method. What are the x-intercepts of the function?

27. $f(x) = x^2 - 8$

28. $g(x) = x^2 - 18$

29. $g(x) = (x - 1)^2 - 4$

30. $G(x) = (x + 2)^2 - 1$

31. $F(x) = (2x + 3)^2 - 32$

32. $g(x) = (3x - 2)^2 - 75$

In Problems 33–38, find the zeros of each quadratic function by completing the square. What are the x-intercepts of the function?

33. $f(x) = x^2 + 4x - 8$

34. $f(x) = x^2 - 6x - 9$

35. $g(x) = x^2 - \frac{1}{2}x - \frac{3}{16}$

36. $g(x) = x^2 + \frac{2}{3}x - \frac{1}{3}$

37. $F(x) = 3x^2 + x - \frac{1}{2}$

38. $G(x) = 2x^2 - 3x - 1$

In Problems 39–52, find the real zeros, if any, of each quadratic function using the quadratic formula. What are the x-interce the graph of the function?

39. $f(x) = x^2 - 4x + 2$

40. $f(x) = x^2 + 4x + 2$

41. $g(x) = x^2 - 4x - 1$

42. $g(x) = x^2 + ($

43. $F(x) = 2x^2 - 5x + 3$

44. $g(x) = 2x^2 + 5x + 3$

45. $P(x) = 4x^2 - x + 2$

46. $H(x) = 4x^2 +$

47. $f(x) = 4x^2 - 1 + 2x$

48. $f(x) = 2x^2 - 1 + 2x$

49. $G(x) = 2x(x + 2) - 3$

50. $F(x) = 3x(x$

51. $P(x) = 9x^2 - 6x + 1$

52. $g(x) = 4x^2 + 20x + 25$

In Problems 53–58, solve $f(x) = g(x)$. What are the points of intersection of the graphs of the two functions?

53. $f(x) = x^2 + 6x + 3$
$g(x) = 3$

54. $f(x) = x^2 - 4x + 3$
$g(x) = 3$

55. $f(x) = -2x^2 + 1$
$g(x) = 3x + 2$

56. $f(x) = 3x^2 - 7$
$g(x) = 10x + 1$

57. $f(x) = x^2 - x + 1$
$g(x) = 2x^2 - 3x - 14$

58. $f(x) = x^2 + 5x - 3$
$g(x) = 2x^2 + 7x - 27$

In Problems 59–76, find the real zeros of each function. What are the x-intercepts of the graph of the function?

59. $P(x) = x^4 - 6x^2 - 16$

60. $H(x) = x^4 - 3x^2 - 4$

61. $f(x) = x^4 - 5x^2 + 4$

62. $f(x) = x^4 - 10x^2 + 24$

63. $G(x) = 3x^4 - 2x^2 - 1$

64. $F(x) = 2x^4 - 5x^2 - 12$

65. $g(x) = x^6 + 7x^3 - 8$

66. $g(x) = x^6 - 7x^3 - 8$

67. $G(x) = (x + 2)^2 + 7(x$

68. $f(x) = (2x + 5)^2 - (2x + 5) - 6$

69. $f(x) = (3x + 4)^2 - 6(3x + 4) + 9$

70. $H(x) = (2 - x)^2 + (2$

71. $P(x) = 2(x + 1)^2 - 5(x + 1) - 3$

72. $H(x) = 3(1 - x)^2 + 5(1 - x) + 2$

73. $G(x) = x - 4\sqrt{x}$

74. $f(x) = x + 8\sqrt{x}$

75. $g(x) = x + \sqrt{x} - 20$

76. $f(x) = x + \sqrt{x} - 2$

┌ Mixed Practice

In Problems 77–88, find the real zeros of each quadratic function using any method you wish. What are the x-intercepts, if graph of the function?

77. $f(x) = x^2 - 50$

78. $f(x) = x^2 - 20$

79. $g(x) = 16x^2 - 8x + 1$

80. $F(x) = 4x^2 -$

81. $G(x) = 10x^2 - 19x - 15$

82. $f(x) = 6x^2 + 7x - 20$

83. $P(x) = 6x^2 - x - 2$

84. $H(x) = 6x^2 +$

85. $G(x) = x^2 + \sqrt{2}x - \dfrac{1}{2}$ **86.** $F(x) = \dfrac{1}{2}x^2 - \sqrt{2}x - 1$ **87.** $f(x) = x^2 + x - 4$ **88.** $g(x) = x^2 + x$