APPENDIX A.2 EXERCISES

In Exercises 1–4, write the polynomial in standard form and state its degree.

1. $2x - 1 + 3x^2$ **2.** $x^2 - 2x - 2x^3 + 1$

3. $1 - x^7$ **4.** $x^2 - x^4 + x - 3$

In Exercises 5–8, state whether the expression is a polynomial.

5. $x^3 - 2x^2 + x^{-1}$ **6.** $\dfrac{2x - 4}{x}$

7. $(x^2 + x + 1)^2$ **8.** $1 - 3x + x^4$

In Exercises 9–18, simplify the expression. Write your answer in standard form.

9. $(x^2 - 3x + 7) + (3x^2 + 5x - 3)$

10. $(-3x^2 - 5) - (x^2 + 7x + 12)$

11. $(4x^3 - x^2 + 3x) - (x^3 + 12x - 3)$

12. $-(y^2 + 2y - 3) + (5y^2 + 3y + 4)$

13. $2x(x^2 - x + 3)$ **14.** $y^2(2y^2 + 3y - 4)$

15. $-3u(4u - 1)$ **16.** $-4v(2 - 3v^3)$

17. $(2 - x - 3x^2)(5x)$ **18.** $(1 - x^2 + x^4)(2x)$

In Exercises 19–40, expand the product. Use vertical alignment in Exercises 33 and 34.

19. $(x - 2)(x + 5)$ **20.** $(2x + 3)(4x + 1)$

21. $(3x - 5)(x + 2)$ **22.** $(2x - 3)(2x + 3)$

23. $(3x - y)(3x + y)$ **24.** $(3 - 5x)^2$

25. $(3x + 4y)^2$ **26.** $(x - 1)^3$

27. $(2u - v)^3$ **28.** $(u + 3v)^3$

29. $(2x^3 - 3y)(2x^3 + 3y)$ **30.** $(5x^3 - 1)^2$

31. $(x^2 - 2x + 3)(x + 4)$ **32.** $(x^2 + 3x - 2)(x - 3)$

33. $(x^2 + x - 3)(x^2 + x + 1)$

34. $(2x^2 - 3x + 1)(x^2 - x + 2)$

35. $(x - \sqrt{2})(x + \sqrt{2})$ **36.** $(x^{1/2} - y^{1/2})(x^{1/2} + y^{1/2})$

37. $(\sqrt{u} + \sqrt{v})(\sqrt{u} - \sqrt{v})$ **38.** $(x^2 - \sqrt{3})(x^2 + \sqrt{3})$

39. $(x - 2)(x^2 + 2x + 4)$ **40.** $(x + 1)(x^2 - x + 1)$

In Exercises 41–44, factor out the common factor.

41. $5x - 15$ **42.** $5x^3 - 20x$

43. $yz^3 - 3yz^2 + 2yz$ **44.** $2x(x + 3) - 5(x + 3)$

In Exercises 45–48, factor the difference of two squares.

45. $z^2 - 49$ **46.** $9y^2 - 16$

47. $64 - 25y^2$ **48.** $16 - (x + 2)^2$

In Exercises 49–52, factor the perfect square trinomial.

49. $y^2 + 8y + 16$ **50.** $36y^2 + 12y + 1$

51. $4z^2 - 4z + 1$ **52.** $9z^2 - 24z + 16$

In Exercises 53–58, factor the sum or difference of two cubes.

53. $y^3 - 8$ **54.** $z^3 + 64$

55. $27y^3 - 8$ **56.** $64z^3 + 27$

57. $1 - x^3$ **58.** $27 - y^3$

In Exercises 59–68, factor the trinomial.

59. $x^2 + 9x + 14$ **60.** $y^2 - 11y + 30$

61. $z^2 - 5z - 24$ **62.** $6t^2 + 5t + 1$

63. $14u^2 - 33u - 5$ **64.** $10v^2 + 23v + 12$

65. $12x^2 + 11x - 15$ **66.** $2x^2 - 3xy + y^2$

67. $6x^2 + 11xy - 10y^2$ **68.** $15x^2 + 29xy - 14y^2$

In Exercises 69–74, factor by grouping.

69. $x^3 - 4x^2 + 5x - 20$ **70.** $2x^3 - 3x^2 + 2x - 3$

71. $x^6 - 3x^4 + x^2 - 3$ **72.** $x^6 + 2x^4 + x^2 + 2$

73. $2ac + 6ad - bc - 3bd$

74. $3uw + 12uz - 2vw - 8vz$

In Exercises 75–90, factor completely.

75. $x^3 + x$ **76.** $4y^3 - 20y^2 + 25y$

77. $18y^3 + 48y^2 + 32y$ **78.** $2x^3 - 16x^2 + 14x$

79. $16y - y^3$ **80.** $3x^4 + 24x$

81. $5y + 3y^2 - 2y^3$ **82.** $z - 8z^4$

83. $2(5x + 1)^2 - 18$ **84.** $5(2x - 3)^2 - 20$

85. $12x^2 + 22x - 20$ **86.** $3x^2 + 13xy - 10y^2$

87. $2ac - 2bd + 4ad - bc$ **88.** $6ac - 2bd + 4bc - 3ad$

89. $x^3 - 3x^2 - 4x + 12$ **90.** $x^4 - 4x^3 - x^2 + 4x$

91. Writing to Learn Show that the grouping

$$(2ac + bc) - (2ad + bd)$$

leads to the same factorization as in Example 11b. Explain why the third possibility,

$$(2ac - bd) + (-2ad + bc)$$

does not lead to a factorization.