CHAPTER TEST

Simplify the expression. Tell which properties of exponents you used.

1. $x^3 \cdot x^2 \cdot x^{-4}$

2. $(2x^{-2}y^3)^{-5}$

3. $\left(\dfrac{x^{-4}}{y^2}\right)^{-2}$

4. $\dfrac{3(xy)^3}{27x - 5y^3}$

Graph the polynomial function.

5. $f(x) = -x^3$

6. $f(x) = x^4 - 2x^2 - 5x + 1$

7. $f(x) = x^5 - x^4 - 9$

Perform the indicated operation.

8. $(2x^3 + 5x^2 - 7x + 4) + (x^3 - 3x^2 - 4x)$

9. $(3x^3 - 4x^2 + 3x - 5) - (x^2 + 4x - 8)$

10. $(3x - 2)(x^2 + 4x - 7)$

11. $(3x - 5)^3$

12. $(3x^3 - 14x^2 + 16x - 22) \div (x - 4)$

13. $(6x^4 + 7x^2 + 4x - 17) \div (3x^2 - 3x + 2)$

Factor the polynomial completely.

14. $8x^3 + 27$

15. $x^4 + 5x^2 - 6$

16. $x^3 - 3x^2 - 4x + 12$

Find all real zeros of the function.

17. $f(x) = x^3 + x^2 - 22x - 40$

18. $f(x) = 4x^4 - 8x^3 - 19x^2 + 23x - 6$

Write a polynomial function f of least degree that has rational coefficients, a leading coefficient of 1, and the given zeros.

19. $-1, 3, 4$

20. $6, 2i$

21. $-3, -1, 1 - \sqrt{5}$

22. $1 + 3i, 4 + \sqrt{10}$

Use a graphing calculator to graph the function. Identify the x-intercepts and the points where the local maximums and local minimums occur.

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

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

Use finite differences and a system of equations to find a polynomial function that fits the data in the table.

25.

x	1	2	3	4	5	6
f(x)	3	1	1	3	7	13

26.

x	1	2	3	4	5	6
f(x)	0	−7	−4	20	80	185

27. GROSS DOMESTIC PRODUCT In 2003, the gross domestic product (GDP) of the United States was about 1.099×10^{13} dollars. The population of the U.S. in 2003 was about 2.91×10^8. What was the per capita GDP in 2003?

28. TELEVISION From 1980 to 2002, the number T (in millions) of households in the United States with televisions and the percent P of those households with VCRs can be modeled by

$$T = 1.22x + 76.9 \quad \text{and} \quad P = -0.205x^2 + 8.36x + 1.98$$

where x is the number of years since 1980. Write a polynomial model for the total number of U.S. households with both televisions and VCRs.

29. GEOMETRY A rectangular prism has edges of lengths x, $x + 2$, and $2x - 3$ inches. The volume of the prism is 1040 cubic inches. Write a polynomial equation that models the prism's volume. What are the prism's dimensions?