5-2 Practice

Form G

Polynomials, Linear Factors, and Zeros

Write each polynomial in factored form. Check by multiplication.

1. $2x^3 + 10x^2 + 12x$

2. $x^4 - x^3 - 6x^2$

3. $-3x^3 + 18x^2 - 27x$

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

5. $x^3 + 7x^2 + 15x + 9$

6. $2x^4 + 23x^3 + 60x^2 - 125x - 500$

Find the zeros of each function. Then graph the function.

7. $y = (x + 1)(x - 1)(x - 3)$

8. $y = (x + 2)(x - 3)$

9. $y = x(x - 2)(x + 5)$

10. $y = (x - 6)(x + 3)$

11. $y = (x + 4)^2(x + 1)$

12. $y = (x - 1)(x + 7)$

Write a polynomial function in standard form with the given zeros.

13. $x = -1, 3, 4$

14. $x = 1, 1, 2$

15. $x = -3, 0, 0, 5$

16. $x = 4, 2, -3, 0$

17. $x = -1, 5, -2$

18. $x = -6, 0$

Find the zeros of each function. State the multiplicity of multiple zeros.

19. $y = (x - 5)^3$

20. $y = x(x - 8)^2$

21. $y = (x - 2)(x + 7)^3$

22. $y = x^4 - 8x^3 + 16x^2$

23. $y = 9x^3 - 81x$

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

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Practice (continued)

Polynomials, Linear Factors, and Zeros

Find the relative maximum and relative minimum of the graph of each function.

25. $f(x) = x^3 - 7x^2 + 10x$

26. $f(x) = x^3 - x^2 - 9x + 9$

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

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

29. A rectangular box has a square base. The combined length of a side of the square base, and the height is 20 in. Let x be the length of a side of the base of the box.
   a. Write a polynomial function in factored form modeling the volume V of the box.
   b. What is the maximum possible volume of the box?

30. Reasoning A polynomial function has a zero at $x = -2a$. Find one of its factors.

31. The side of a cube measures $3x + 2$ units long. Express the volume of the cube as a polynomial.

32. Writing The volume of a box is $x^3 - 3x^2 + 3x - 1$ cubic units. Explain how to find the length of a side if the box is a cube.

33. You have a block of wood that you want to use to make a sculpture. The block is currently $3x$ units wide, $4x$ units high, and $5x$ units deep. You need to remove 1 unit from each dimension before you can begin your sculpture.
   a. What is the original volume of the block?
   b. What is the new volume of the block?
   c. What is the volume of the wood that you remove?

34. What are the zeros and the multiplicity of each zero for the polynomial function $x^4 - 2x^2 + 1$?

35. Error Analysis On your homework, you wrote that the polynomial function from the given zeros $x = 3, 0, -9, 1$ is $y = x^4 + 5x^3 - 33x^2 + 27x$. Your friend wrote that the polynomial function is $y = x^3 + 5x^2 - 33x + 27$. Who is correct? What mistake was made?