PRACTICE & PROBLEM SOLVING

Scan for Multimedia

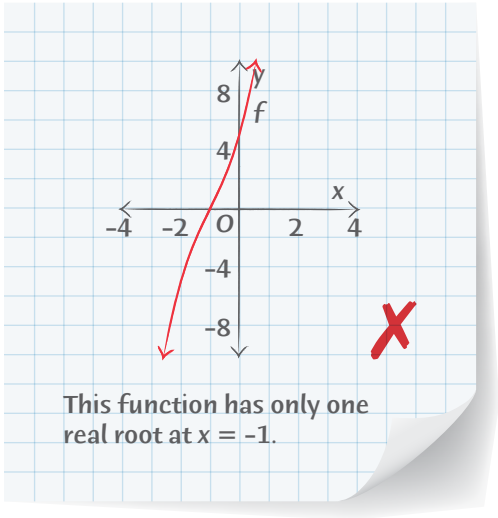
Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

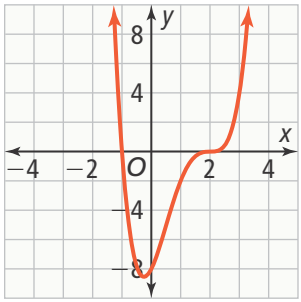
6. **Reason** If you use zeros to sketch the graph of a polynomial function, how can you verify that your graph is correct?

7. **Error Analysis** Describe and resolve two errors that Tonya may have made in finding all the roots of the polynomial function, $f(x) = x^3 + 3x^2 + 7x + 5$.



8. **Higher Order Thinking** How could you use your graphing calculator to determine that $f(x) = (x + 2)(x + 6)(x - 1)$ is not the correct factorization of $f(x) = x^3 + 7x^2 + 16x + 12$? Explain.

9. **Generalize** How can you determine that the polynomial function shown does not have any zeros with even multiplicity? Explain.



10. **Look for Relationships** Factor the polynomial $x^4 - 16$. How many real zeros does the function $g(x) = x^4 - 16$ have?

11. At what points do the graphs of $f(x) = x^3 - 2x^2 - 16x + 20$ and $g(x) = -12$ intersect?

PRACTICE

Sketch the graph of the function by finding the zeros. SEE EXAMPLE 1

12. $f(x) = 3x^3 - 9x^2 - 12x$

13. $g(x) = x^3 - 2x^2 - 11x + 12$

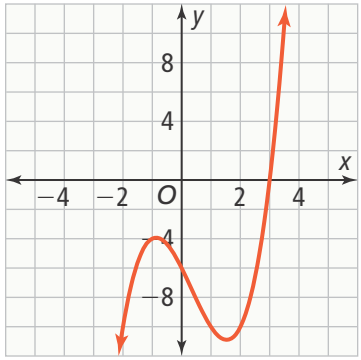
Find the zeros of the function, and describe the behavior of the graph at each zero. SEE EXAMPLE 2

14. $f(x) = x^3 - 8x^2 + 16x$

15. $g(x) = x^3 - x^2 - 25x + 25$

16. $f(x) = 9x^4 - 40x^2 + 16$

17. What are all the real and complex zeros of the polynomial function shown in the graph? SEE EXAMPLE 3



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

18. Waterworks is a company that manufactures and sells paddleboards. Their profit P, in hundreds of dollars earned, is a function of the number of paddleboards sold x, measured in thousands. Profit is modeled by the function $P(x) = -3x^3 + 48x^2 - 144x$. What do the zeros of the function tell you about the number of paddleboards that Waterworks should produce? SEE EXAMPLE 4

What are the solution(s) of the equation? SEE EXAMPLE 5

19. $-3x^3 - x^2 + 54x - 40 = 2x^2 + 6x + 20$

20. $2x^3 + 3x^2 - 36 = x^3 - x^2 + 9x$

21. $-5x^4 + 4x^2 - 12x = -6x^4 + 3x^3$

What are the solutions of the inequality? SEE EXAMPLE 6

22. $x^3 - 9x > 0$

23. $0 > 4x^3 + 8x^2 - x - 2$

24. $64x^2 > -4x^3 - x - 16$

PRACTICE & PROBLEM SOLVING

Practice Tutorial
Mixed Review Available Online

APPLY

25. Make Sense and Persevere A firework is launched vertically into the air. Its height in meters is given by the function shown, where t is measured in seconds.

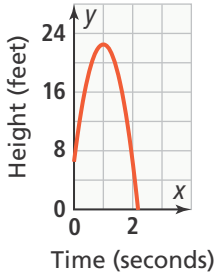
$h = -4.9t^2 + 49t$

a. What is a reasonable domain of the function?

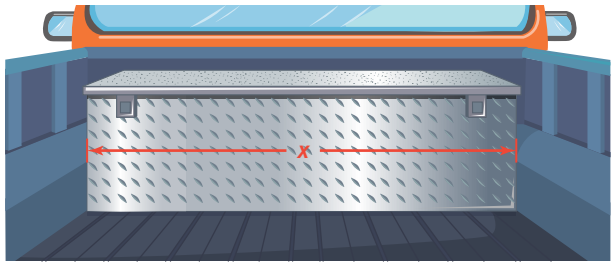
b. What are the zeros of the function? Explain what they represent in this situation.

c. Use technology to find the vertex. What does it represent in this situation?

26. The height of a baseball thrown in the air can be modeled by the function $h(t) = -16t^2 + 32t + 6.5$, where $h(t)$ represents the height in feet of the baseball after t seconds. Explain why the graph of this function only shows one zero.



27. Model With Mathematics The height of a rectangular storage box is less than both its length and width. The function $f(x) = x^3 + 2x^2 - 8x$ represents the volume of the rectangular box, where x represents the width of the box, in inches.



a. Find the factored form of $f(x)$.

b. Find the zeros of the function.

c. You know x represents the width of the box. What do the other two factors represent?

d. Find the dimensions of the box when the volume is 240 in.^{3}.

ASSESSMENT PRACTICE

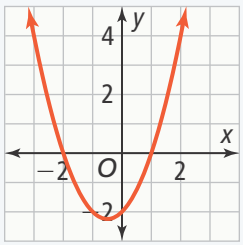
28. Complete each statement so it means the same as 4 is *a zero of the function*.

The function's graph crosses the _____ at 4.

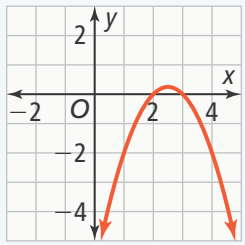
_____ is a factor of the polynomial.

29. SAT/ACT Without the use of a graphing calculator, determine which of the following functions is the graph of $f(x) = x^3 + x^2 - 4x$.

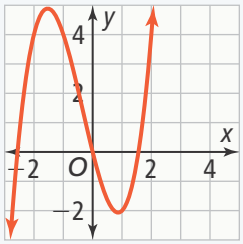
Ⓐ



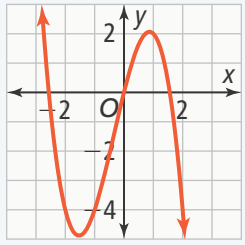
Ⓑ



Ⓒ



Ⓓ



30. Performance Task Venetta opened several deli sandwich franchises in 2000. The profit P (in hundreds of dollars) of the franchises in t years (since the franchises opened) can be modeled by the function $P(t) = t^3 + t^2 - 6t$.

Part A Sketch a graph of the function.

Part B Based on the model, during what years did Venetta not make a profit?

Part C If the model is appropriate, predict the amount of profit Venetta will receive from her franchises in 2020.