

7-5

## Skills Practice

## Roots and Zeros

Solve each equation. State the number and type of roots.

1.  $5x + 12 = 0$

$$-\frac{12}{5}; 1 \text{ real}$$

3.  $x^5 + 4x^3 = 0$

$$0, 0, 0, 2i, -2i$$

$$3 \text{ real, } 2 \text{ imaginary}$$

5.  $4x^2 - 4x - 1 = 0$

$$\frac{1 \pm \sqrt{2}}{2}; 2 \text{ real}$$

2.  $x^2 - 4x + 40 = 0$

$$2 \pm 6i; 2 \text{ imaginary}$$

4.  $x^4 + 625 = 0$

$$5i, 5i, -5i, -5i$$

$$4 \text{ imaginary}$$

6.  $x^5 - 81x = 0$

$$0, -3, 3, -3i, 3i$$

$$3 \text{ real, } 2 \text{ imaginary}$$

State the possible number of positive real zeros, negative real zeros, and imaginary zeros of each function.

7.  $g(x) = 3x^3 - 4x^2 - 17x + 6$

$$+ : 2 \text{ or } 0 \quad - : 1$$

$$\text{imag: } 2 \text{ or } 0$$

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

$$+ : 3 \text{ or } 1 \quad - : 0$$

$$\text{imag: } 2 \text{ or } 0$$

11.  $q(x) = x^4 + 7x^2 + 3x - 9$

$$+ : 1 \quad - : 1$$

$$\text{imag: } 2$$

8.  $h(x) = 4x^3 - 12x^2 - x + 3$

$$+ : 2 \text{ or } 0 \quad - : 1$$

$$\text{imag: } 2 \text{ or } 0$$

10.  $p(x) = x^3 - x^2 + 4x - 6$

$$+ : 3 \text{ or } 1 \quad - : 0$$

$$\text{imag: } 2 \text{ or } 0$$

12.  $f(x) = x^4 - x^3 - 5x^2 + 6x + 1$

$$+ : 2 \text{ or } 0 \quad - : 2 \text{ or } 0$$

$$\text{imag: } 4 \text{ or } 2 \text{ or } 0$$

Find all the zeros of each function.

13.  $h(x) = x^3 - 5x^2 + 5x + 3$

$$3, 1 + \sqrt{2}, 1 - \sqrt{2}$$

15.  $h(x) = x^3 + 4x^2 + x - 6$

$$1, -2, -3$$

17.  $g(x) = x^4 - 3x^3 - 5x^2 + 3x + 4$

$$-1, -1, 1, 4$$

14.  $g(x) = x^3 - 6x^2 + 13x - 10$

$$2, 2+i, 2-i$$

16.  $q(x) = x^3 + 3x^2 - 6x - 8$

$$2, -1, -4$$

18.  $f(x) = x^4 - 21x^2 + 80$

$$-4, 4, -\sqrt{5}, \sqrt{5}$$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

19.  $-3, -5, 1$

$$f(x) = x^3 + 7x^2 + 7x - 15$$

21.  $-5 + i$

$$f(x) = x^2 + 10x + 26$$

23.  $i, 5i$

$$f(x) = x^4 + 26x^2 + 25$$

20.  $3i$

$$f(x) = x^2 + 9$$

22.  $-1, \sqrt{3}, -\sqrt{3}$

$$f(x) = x^3 + x^2 - 3x - 3$$

24.  $-1, 1, i\sqrt{6}$

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