3-6 Additional Practice

Theorems About Roots of Polynomial Equations

List all the possible rational solutions for each equation.

1. $2x^2 + 5x + 3 = 0$ **2.** $2x^4 - 18x^2 + 5 = 0$ **3.** $4x^3 - 12x + 9 = 0$

List all the real and complex roots of each of the following functions.

- **4.** $x^3 + x^2 x + 2 = 0$ **5.** $x^3 - 2x^2 + 4x - 8 = 0$ **6.** $x^5 - 3x^4 - 8x^3 - 8x^2 - 9x - 5 = 0$
- **7.** What is the equation of a quadratic function *P* with rational coefficients that has a zero of 3 + 7i?
- **8.** What is the equation of a polynomial function, *R*, with rational coefficients that have a zero of $4 + \sqrt{5}$ and 3i?
- 9. A section of roller coaster can be modeled by the function: $f(x) = x^5 - 5x^4 - 31x^3 + 113x^2 + 282x - 360$. A walkway bridge will be placed at one of the zeros. What are the possible locations for the walkway bridge?
- 10. A shed in the shape of a rectangular prism measures x feet high, x + 6.5 feet wide, and is x 4 feet deep. The volume of the shed is given by the function $v(x) = x^2 + 2.5x 26$. What is the height, width, and depth of the shed, in feet, if the volume is 990 ft³?
- **11.** Suppose a cubic polynomial, f, has two rational roots c and d and one irrational root which is a conjugate pair $a + \sqrt{b}$, where a and b are rational numbers. Does f have rational coefficients? Explain.