

List the possible rational zeros of each function. (Do not find the zeros.)

1. $f(x) = x^3 - 4x^2 + 11x + 8$

2. $f(x) = 5x^5 + 7x^4 - x + 12$

3. $f(x) = 4x^3 + 31x^2 - 7x + 10$

4. $f(x) = 3x^4 + 9x^2 + 25$

$\frac{1, 2, 5, 10}{1, 2, 4} = \boxed{\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm 2, \pm 5, \pm \frac{5}{2}, \pm \frac{5}{4}, \pm 10}$

Find a third-degree polynomial equation (leave in factored form) with rational coefficients that has the given numbers as roots.

5. 1, -2 and 5

6. 1 and $3i$

7. 3 and $-4i$

8. -6 and $2i$

$y = (x + 6)(x - 2i)(x + 2i)$

Solve Each Equation Using Any Method. Give exact answers and state any multiplicity.

9. $x^3 - 2x^2 + 5x - 10 = 0$

$$10. x^3 - 5x^2 + 7x - 35 = 0$$

$$\begin{array}{r|rrrr} 5 & 1 & -5 & 7 & -35 \\ & \downarrow & 5 & 0 & 35 \\ \hline & 1 & 0 & 7 & 0 \\ & x^2 & x & & R \end{array}$$

$$x^2 + 7 = 0$$

Solutions

$$S, \pm i\sqrt{7}$$

$$x^2 + 7 = 0$$

$$\frac{-7}{-7} \quad \frac{-7}{-7}$$

$$x^2 = -7$$

$$\sqrt{x^2} = \sqrt{-7}$$

$$x = \pm i\sqrt{7}$$

$$11. 2x^4 - 5x^3 - 17x^2 + 41x - 21 = 0$$

$$12. x^4 + 2x^2 = 15$$

$$13. x^4 - 9x^2 = 8x^3$$

$$x^4 - 9x^2 - 8x^3 = 0$$

$$x^2(x^2 - 9 - 8x) = 0$$

$$x^2(x^2 - 8x - 9) = 0$$

$$x^2(x-9)(x+1) = 0$$

$$x = 0 \text{ mult of } 2 \quad x = 9 \quad x = -1$$