

PROBLEM SET 6-5
(Root Theorems)

Use the Rational Root Theorem to list all possible rational roots for each polynomial equation. Then find any actual rational roots.

1. $x^3 - x^2 + 2x - 2 = 0$

2. $x^3 + x^2 + 4x + 4 = 0$

3. $x^3 + 2x^2 - 8x - 16 = 0$

4. $12x^3 - 32x^2 + 25x - 6 = 0$

Find the roots of each equation.

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

6. $2x^4 - 5x^3 - 17x^2 + 41x - 21 = 0$

7. $4x^4 - 37x^2 + 9 = 0$

8. $9x^4 + 3x^3 - 30x^2 + 6x + 12 = 0$

A polynomial equation with rational coefficients has the given roots. Find two additional roots.

9. $4 - \sqrt{6}, \sqrt{3}$

10. $1 + i, -5i$

11. $2 + 3i, 6i$

12. $4 - i, 2 + \sqrt{2}$

Find a polynomial equation with rational coefficients that has the given numbers as roots.

13. 1 and $3i$

14. $3 + i$ and -3

15. $3 + i$ and $-2i$

16. $\sqrt{3}$ and $1 - i$