PROBLEM SET 6-5 AND 6-6

(Root Theorems; Fundamental Theorem of Algebra)

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

1. $4-\sqrt{6}, \sqrt{3}$

2. $1+i, -5i$

3. $2+3i, 6i$

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

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

5. 1 and $3i$

6. $4+\sqrt{2}$ and -3

For each equation, state the number of complex roots, the possible number of real roots and the possible rational roots.

7. $x^3+4x^2+5x-1=0$

8. $x^7-x^3-2x-3=0$

9. $x^{10}+x^8-x^4+3x^2-x+1=0$

10. $2x^4-x^3+2x^2+5x-26=0$

Find the roots/zeros of the following.

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

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

13. $y=x^3-4x^2+9x-36$

14. $y=2x^3+14x^2+13x+6$

15. $2x^4-5x^3-17x^2+41x-21=0$

16. $x^4-6x^2+8=0$