Section 5-2 : Zeroes/Roots of Polynomials

For problems 1 – 6 list all of the zeros of the polynomial and give their multiplicities.

1. $f(x) = x^2 + 2x - 120$

2. $R(x) = x^2 + 12x + 32$

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

4. $A(x) = x^5 + 2x^4 - 35x^3 + 92x^2 - 92x + 32 = (x-1)^2(x+8)(x-2)^2$

5. $Q(x) = x^{10} + 17x^9 + 115x^8 + 387x^7 + 648x^6 + 432x^5 = x^5(x+3)^3(x+4)^2$

6. $g(x) = x^8 + 2x^7 - 14x^6 - 16x^5 + 49x^4 + 62x^3 - 44x^2 - 88x - 32 = (x+4)(x+1)^4(x-2)^3$

For problems 7 – 11 $x = r$ is a root of the given polynomial. Find the other two roots and write the polynomial in fully factored form.

7. $P(x) = x^4 - 3x^3 - 18x^2$; $r = 6$

8. $P(x) = x^3 + x^2 - 46x + 80$; $r = -8$

9. $P(x) = x^3 - 9x^2 + 26x - 24$; $r = 3$

10. $P(x) = 12x^3 + 13x^2 - 1$; $r = -1$

11. $P(x) = 4x^3 + 11x^2 - 134x - 105$; $r = 5$

For problems 12 – 14 determine the smallest possible degree for a polynomial with the given zeros and their multiplicities.

12. $r_1 = -2$ (multiplicity 1), $r_2 = 1$ (multiplicity 1), $r_3 = 4$ (multiplicity 1)

13. $r_1 = 3$ (multiplicity 4), $r_2 = -5$ (multiplicity 1)

14. $r_1 = 7$ (multiplicity 2), $r_2 = 4$ (multiplicity 7), $r_3 = -10$ (multiplicity 5)

15. A 7th degree polynomial has roots $r_1 = -9$ (multiplicity 2) and $r_2 = 3$ (multiplicity 1). What is the maximum number of remaining roots for the polynomial?