CH 7 Polynomial Equations

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October 21, 2020

1 Polynomial Equation

is in the form: $p(x) = 0$ where p(x) is a polynomial
Degree is the highest power of x with a NZ coefficient
1st degree root: $-\frac{b}{a}$
2nd degree root: quadratic formula
3rd degree root:

2 Solution of Cubic Equations

HELP¡¡¡¡¡

3 Higher Degrees

There are no formulas for roots of ¿4th degree equations

4 The Fundamental Theorem of Algebra

Every polynomial equation of a degree at least 1 has a root $\in \mathbb{C}$
see proof CH 24

5 Theorem 7.2

Every polynomial of degree n factorizes as a product of linear polynomials and has exactly n roots $\in \mathbb{C}$ (counting repeats).

6 Theorem 7.3 (Complex Conjugates)

Every real polynomial factorizes as a product of real linear and real quadratic polynomials and has its non-real roots appearing in complex conjugate pairs
see 55/56 for proof

7 Relationships between Roots, Prop 7.1

Let the roots of:

$$x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0 = 0$$

be $\alpha_1, \alpha_2, \ldots, \alpha_n$. If s_1 denotes the sum of the roots, s_2 denotes the sum of all the products of pairs of roots,...

$$s_n = \alpha_1\alpha_2 \ldots \alpha_n \qquad\qquad = (-1)^n a_0$$

see 56/57