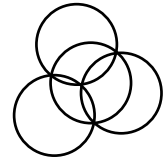


### 3. PROBLEMS ABOUT POLYNOMIALS by Răzvan Gelca



- c1. Prove that the zeros of the polynomial of complex variable

$$P(z) = z^7 + 7z^4 + 4z + 1$$

lie inside the disk of radius 2 centered at the origin.

- c2. Find the zeros of the polynomial

$$P(x) = x^4 - 6x^3 + 18x^2 - 30x + 25$$

knowing that the sum of two of them is 4.

- c3. Find a polynomial with integer coefficients that has  $\sqrt{2} + \sqrt{3}$  as one of its zeros.
- c4. Show that  $x^4 + x^2 + 1$  is the product of two non-constant polynomials with integer coefficients.
- c5. Show that  $x^4 + 1$  is the product of two non-constant polynomials with real coefficients, but not the product of two non-constant polynomials with integer coefficients.