TEORIA DOS NÚMEROS

On a basic set of polynomials and a result about entire function mapping $\mathbb{Q}$ in itself

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Abstract

A set of polynomials $\Phi = \{\varphi_n(z)\}_{n \geq 0}$ is said to be a basic when every polynomial can be uniquely expressed as a finite combination of the elements of Φ. In particular

$$z^n = \sum_i \pi_{ni} \varphi_i(z), \qquad n = 0, 1, 2, \ldots. \tag{1}$$

Given an analytic function $f(z) = \sum_{n=0}^{\infty} a_n z^n$, there is formally an associated basic series $(\sum a_n (\sum \pi_{ni} \varphi_i(z)) = \sum c_n \varphi_n(z))$. When this associated series converges uniformly to $f(z)$ in some domain, it is said to represent $f(z)$ in that domain. We introduce a particular basic set of polynomials that represents any entire functions. For this, we apply the theory about polynomial expansions of analytic functions. Moreover, we use this basic set to study entire functions mapping $\mathbb{Q}$ in itself.