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Part III PAPER VI

Polynomial Ring -

Polynomial Over a Ring -

An expression of the form

$a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$

is called a Polynomial, where the coefficients $a_0, a_1, a_2, \cdots a_n$ are numbers only.

Polynomial over a ring -

Let R be a ring. Let $a_0, a_1, a_2 \cdots a_n \in R$ be arbitary

A polynomial over a ring R is defined as an infinite ordered system $(a_0, a_1, a_2 \cdots a_i \cdots)$ with at most a finite number of non-zero elements

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Equal Polynomial – Two polynomia
$(a_0, a_1, a_2 \cdots a_i \cdots)$ and $(b_0, b_1 \cdots b_i$
are said to be equal if $a_i = b_i \; \forall i$

A Polynomial $(a_0, a_1, a_2, \cdots a_i \cdots)$ is usually denoted by the symbol

$$f(x) = a_0 + a_1 x + a_2 x^2 + \cdots + a_i x^i + \cdots$$

In this expression x is an arbitary not belonging to R which commutes with every elements of R. Also $f(x)$ is called a polynomial in one indeterminate over the ring R.
$a_0, a_1 x, a_2 x^2, \cdots$ are called terms of this polynomial where $a_0, a_1, a_2, \cdots$ are called coefficients of the terms.