



IIT Madras
ONLINE DEGREE

Polynomials

Introduction

What is a Polynomial?

A Layman's Perspective:

A Polynomial is one kind of mathematical expression which is a sum of several mathematical terms.

Each term in this expression is called monomial and the term can be a number, a variable or product of several variables.

Definition: (A mathematician's Perspective)

A polynomial is an algebraic expression in which the only arithmetic is addition, subtraction, multiplication and “natural” exponents of the variables.

Examples:

Why do we call them Polynomials?

The word “Polynomial” is derived from two words

Poly + Nomen

The diagram shows the words 'Poly' and 'Nomen' in italics, separated by a plus sign. Below 'Poly' is the word 'many' in yellow, connected by a yellow curved line. Below 'Nomen' is the word 'name' in yellow, also connected by a yellow curved line.

Each term is called monomial.

A polynomial having two terms is called binomial.

A polynomial with three terms is called trinomial.

Eg. A polynomial in one variable can be represented as

$$a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0 = \sum_{m=0}^n a_m x^m.$$

The diagram shows the equation $a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0 = \sum_{m=0}^n a_m x^m.$ with green labels and brackets. A bracket points from 'Coefficient of the term' to a_m . Another bracket points from 'Exponent' to x^m . A third bracket points from 'variable' to x .

Identification of Polynomials

Identify whether the following are polynomials or not.

1. x^2+4x+2

2. $x+x^{1/2}$

3. $x+y+xy+x^3$

Analysis:

Types of Polynomials

Polynomials in one variable

Eg. $x^4 + 1$

Polynomials in two variables

Eg. $x^4 + y^5 + xy$

Polynomials in more than two variables

Eg. $xyz + x^2z^5$