Add Two Polynomials Using Arrays

Input: A[] = {5, 0, 10, 6} B[] = {1, 2, 4}
Output: sum[] = {6, 2, 14, 6}

The first input array represents "5 + 0x^1 + 10x^2 + 6x^3“

The second array represents "1 + 2x^1 + 4x^2"

And Output is "6 + 2x^1 + 14x^2 + 6x^3“

Polynomial (Array Representation)

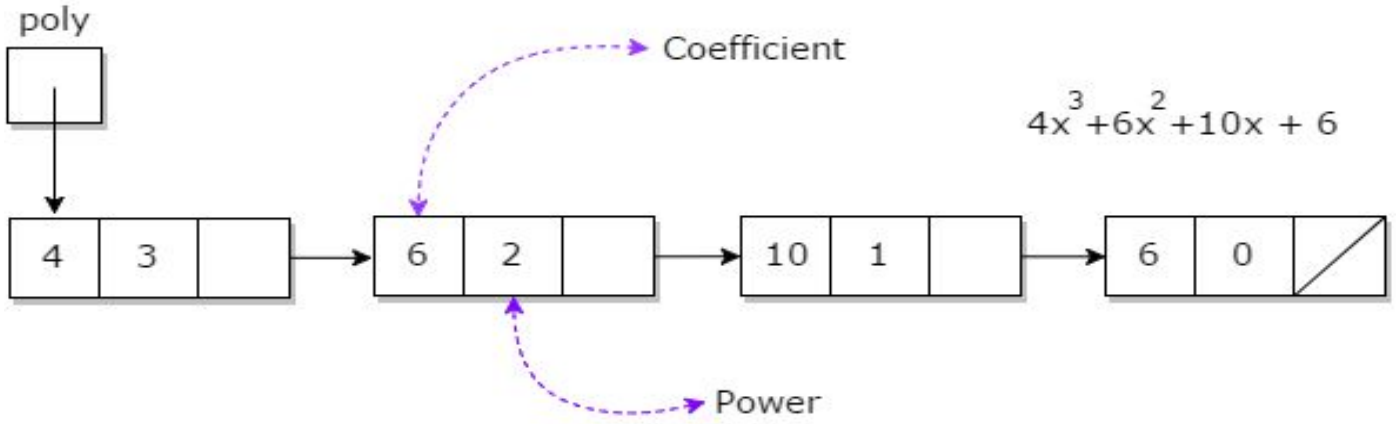
- Advantages of using an Array:
  - Only good for non-sparse polynomials.
  - Ease of storage and retrieval.
- Disadvantages of using an Array:
  - Have to allocate array size priorly.
  - Huge array size required for sparse polynomials. Waste of space and runtime.

Polynomial Representation (using Linked List)

- A polynomial p(x) is the expression in variable x which is in the form ($ax^n + bx^{n-1} + \ldots. + jx + k$), where a, b, c …., k fall in the category of real numbers and 'n' is non negative integer, which is called the degree of polynomial.
- An essential characteristic of the polynomial is that each term in the polynomial expression consists of two parts:
  - one is the coefficient
  - other is the exponent
- <u>Example:</u>
  - $10x^2 + 26x$,
    - here 10 and 26 are coefficients and 2, 1 is its exponential value.

Polynomial Representation (using Linked List)

- Points to keep in Mind while working with Polynomials:
- The sign of each coefficient and exponent is stored within the coefficient and the exponent itself
- Additional terms having equal exponent is possible one
- The storage allocation for each term in the polynomial must be done in ascending and descending order of their exponent



Polynomial Representation (using Linked List)

- Addition of polynomial

  1) Input: 1st number = $5x^2 + 4x^1 + 2x^0$

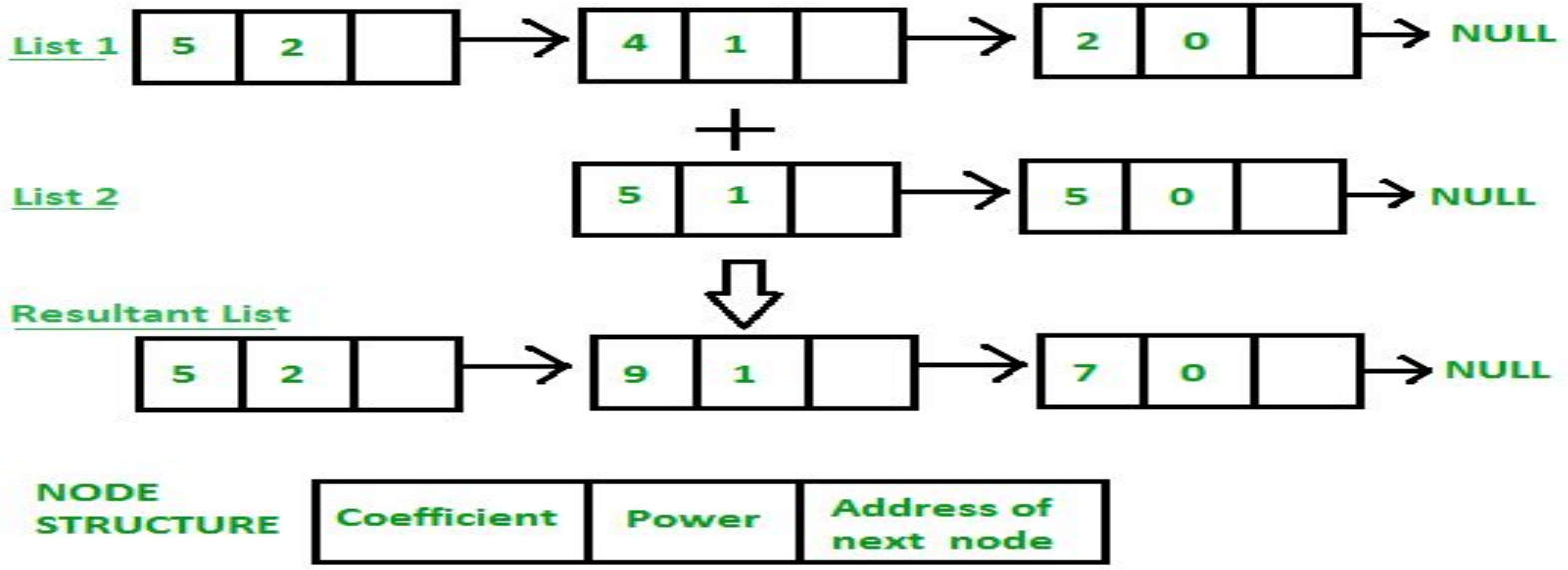
     2nd number = $5x^1 + 5x^0$

     Output: $5x^2-1x^1-3x^0$

  2) Input: 1st number = $5x^3 + 4x^2 + 2x^0$

     2nd number = 5x^1 - 5x^0

     Output: $5x^3 + 4x^2 + 5x^1 - 3x^0$



Polynomial Representation (using Linked List)

Subtraction of polynomial

Input: 1st number = $5x^2 + 4x^1 + 2x^0$

2nd number = $5x^1 + 5x^0$

Output: $5x^2 + 9x^1 + 7x^0$

Polynomial Representation (using Linked List)

Multiplication of polynomial

Input: Poly1: 3x^2 + 5x^1 + 6, Poly2: 6x^1 + 8

Output: 18x^3 + 54x^2 + 76x^1 + 48