Design Polynomial Class

Difficulty: Miderm Expect Time: 20min Homework

Please implement a class called **Polynomial** to handle one-dimensional polynomials (one variable with constant coefficients). This class needs to be able to store the coefficients and implement operations such as addition, subtraction, multiplication, and assignment.

An example of a one-dimensional polynomial is $x^3 + 3x^2 + 7x + 8$, which can be expressed with a set of coefficients like **{8, 7, 3, 1}**.

- Please design your own data structure to store these polynomials and implement the following methods:

  - **`Polynomial`**
    Construct a zero polynomial (no any terms in the polynomial).

  - **`Polynomial(double* params, int size)`**
    Construct a one-dimensional polynomial based on the given coefficients(params) which has the given size.

  - **`Polynomial(const Polynomial& copy)`**
    Copy **constructor**.

  - **`int mySize()`**
    Return the number of terms of the polynomial.
    Example: `poly1.mySize()` returns 2 and `poly2.mySize()` returns 3 (non-zero coefficient), where poly1 is 3x+9 and poly2 is $0x^3+5x^2+6x+8$.

  - **`double evaluate(const Polynomial& poly, const double& var)`**
    Return the value of the polynomial after substituting **var** into the variables.
    Example: `evaluate(poly1,2)` returns 15.

Overload operators to meet the following operational requirements.

- **Assignment (define `operator=`)**
  Assign a polynomial to another polynomial.
  Example: `poly= poly1`, then `poly` is $3x + 9$

- **Return or set the coefficient of an indicated term in the polynomial (define `operator[]`)**
  Example:
  `poly1[0]` return the coefficient of x with power of 0, which has the value of 9
  `poly1[2]` = 1 , then `poly1` becomes $x^2 + 3x + 9$

- **Addition(define `operator+`)**
  Implement the addition of two polynomials.
  Example:
  `poly = poly1 + poly2,` then poly is $5x^2 + 9x + 17$

`poly = 5 + poly1,` then poly is $3x + 14$

`poly = poly1 + 10.5,` then poly is $3x + 19.5$

- **Subtraction(define `operator-`)**

  Implement the subtraction of two polynomials.

  Example:

  `poly = poly1 - poly2,` then poly is $-5x^2 - 3x + 1$

  `poly = 6 - poly1,` then poly is $-3x - 3$

  `poly = poly1 - 1.6,` then poly is $3x + 7.4$

- **Multiplication (define `operator*`)**

  Implement the multiplication of two polynomials.

  Example:

  `poly = poly1 * poly2`, then poly is $15x^3 + 63x^2 + 78x + 72$.

  `poly = 23 * poly1`, then poly is $69x + 207$.

  `poly = poly1 * 7`, then poly is $21x + 63$.

Input

1. Please implement the class Polynomial in light of its declaration in solution.h.
2. The input for the program will be handled by the provided code.
3. The Online Judge will replace the following files:
   a) main.cpp
4. The following files are two sample test cases of Online Judge, copy the contents of the following file into main.cpp for testing.
   a) case1.cpp
   b) case2.cpp

Output

1. Please DON'T print any data to STDOUT.
2. The output for the program will be handled by the provided code.
3. The sample output and input files are shown as follows:
    a) out001.txt corresponds to case1.cpp
    b) out002.txt corresponds to case2.cpp