แบบฝึกปฏิบัติการครั้งที่ 3

Write a Polynomial class that offers four methods:

1. **`void addTerm(double coef, int exp)`** add new term (ordered by exponent)

2. **`Polynomial add(Polynomial b)`** return sum of two polynomials between *this* and b

3. **`Polynomial differential()`** return differential of *this*

4. **`void printElement()`** print the polynomial

Use the following code to verify your methods

```
public static void main(String[] args) {
     Polynomial p1 = new Polynomial();
     p1.addTerm(4, 2);
     p1.addTerm(7, 0);
     p1.addTerm(3, 4);
     p1.addTerm(5, 1);
     p1.printElement();

     Polynomial p2 = new Polynomial();
     p2.addTerm(6, 3);
     p2.addTerm(-8, 2);
     p2.printElement();

     Polynomial sum = p1.add(p2);
     sum.printElement();
     Polynomial sumdiff = sum.differential();
     sumdiff.printElement();
}
```

Results

```
3.0x^4 + 4.0x^2 + 5.0x^1 + 7.0x^0

6.0x^3 + -8.0x^2

3.0x^4 + 6.0x^3 + -4.0x^2 + 5.0x^1 + 7.0x^0

12.0x^3 + 18.0x^2 + -8.0x^1 + 5.0x^0
```

A polynomial is a mathematical function of the form:

$p(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots + a_{n-1}x + a_n$

A *term* is a mathematical function of the form $t(x) = cX^e$, where c is any real number and e is any nonnegative integer. The number c is called the *coefficient*, and the number e is called the *exponent*.

To define a class whose objects represent polynomials, use a singly linked list of Term objects.

For example, the polynomial $p(x) = 3x^2 - 2x + 5$ could be represented as a list of three elements, where the first element represents the term $3x^2$, the second element represents the term $-2x$, and the third element represents the (constant) term 5.