Programming Assignment No. 2

Due Date: October 5, 2016 (Wednesday)

In this programming assignment, you are expected to implement the Polynomial ADT using doubly linked lists.

The Polynomial ADT
A polynomial object is a homogeneous ordered list of terms <coefficient, exponent>, where each term is unique.

Operations	Description
int getDegree()	Returns the degree of the polynomial
double getCoefficient(int exponent)	Returns the coefficient for the given input term "exponent"
Polynomial padd(Polymonial p)	Returns a new Polynomial object by adding this object with a given input “p”.
Polynomial pmult(Polynomial p)	Returns a new Polynomial object by multiplying this object with a given input "p".
double evaluate(double x)	Returns the result of the polynomial evaluation for a given input "x"
void addTerm(Term t)	Insert a new term to this polynomial object. Merge terms if a term with the same exponent as the given input term already exists.
String dump()	Returns the contents of the current polynomial as a sequence of (coeff_n, expo_n) (coeff_n-1, expo_n-1) ... (coeff_0, expo_0) in decreasing order of terms.

You need to download and complete the following files:
(Download all files from here.)

- Polynomial.java (ADT, do not modify)
- Term.java (do not modify)
- PolynomialDriver.java (do not modify)
- DLinkedList.java
- DLinkedPolynomial.java

Program Testing:
The input data file format should look like the following:

```
File: Poly_X
10.0    8
5.0     4
3.0     1
2.0     3
7.0     0
```

File: Poly_Y

```
1.0     1
2.0     2
3.0     4
4.0     0
```

Each line contains a term denoted by a pair {coefficient, exponent} delimited by either blank or tab. Notice that each term will be given in any order (not necessarily increasing or decreasing order of exponent).

Execution of the driver program will print the following result:

```
$ java -cp . PolynomialDriver Poly_X Poly_Y

f(x) = (10.0, 8) (5.0, 4) (2.0, 3) (3.0, 1) (7.0, 0)
Degree: 8
f(10) = 1.000052037E9
Coefficient for 4 is  5.0

g(x) = (3.0, 4) (2.0, 2) (1.0, 1) (4.0, 0)
Degree: 4
g(10) = 30214.0
Coefficient for 4 is  3.0

f(x) +  g(x) ==>
(10.0, 8) (8.0, 4) (2.0, 3) (2.0, 2) (4.0, 1) (11.0, 0)

f(x)*g(x) ==> (Note: f(x) didn't change even after the previous addition.)
(30.0, 12) (20.0, 10) (10.0, 9) (55.0, 8) (6.0, 7) (10.0, 6) (18.0, 5) (43.0, 4) (14.0, 3) (17.0, 2) (19.0, 1) (28.0, 0)
```

Implementation Guidelines

- You may define additional classes, if necessary.
- You may add additional private fields and methods, if necessary.
- Neglect error conditions.

What to submit?

- Hardcopy of your source code. (Submit in class.)
- Your source files archived in .zip format. (Email to your TA.)