Project 2: Polynomial Arithmetic with HashMap
Due: 11:59 pm 4/06/19
Total Points: 10
Extra Points:

1) **If you did not submit project 1 and you submit this project, fully working, you will receive a 5 on project 1.**
2) **If you submitted project 1 and your grade is < 10, and you submit this project, fully working, up to 5 points will be added onto project 1 (maxing out at 10).**
3) **If you did not implement division on project 1, and you implemented a working division on this project, you will receive an extra 1.5 on this project**
4) **If you did not implement remainder on project 1, and you implemented a working remainder on this project, you will receive an extra 1.5 on this project**

Projects must be submitted on BlackBoard as a ZIPPED FOLDER with the folder name as Y{8 Digit CUNY ID}
for example your student id is 12345678 than the folder name is Y12345678
Within the folder will only be source code, NO .class files. The files in the folder will be:

1) Y12345678.java
2) Utility.java
3) Polynomial.java
4) PolynomialInterface.java

Any projects submitted that **DOES NOT** have this naming convention will not be graded.
If you do not submit anything, you will receive 1 point for the project. Any projects that **do not compile or work** will receive a 0. Excuses such as "It compiles on my computer" or "It worked last time" will not be accepted. Your program must work on all machines not just yours.

If you are using an IDE such as eclipse, before submitting, remove all package statements from all files.
Late penalty Any project submitted:
1 day late will receive a max possible score of 8 and extra credit will not be rewarded
2 days late will receive a max possible score of 7 and extra credit will not be rewarded
3 days late will receive a max possible score of 6 and extra credit will not be rewarded
Any project submitted after 3 days will not be graded.
Cheating Any one caught cheating, copying code or letting others copy, will receive a 0 and reported. Collaborating with others is encourage on a high level, but code and implementation should never be shared.

Project Specs:
You have been hired by a math teacher to help write a program that will read in any two polynomials and will be able to do arithmetic with them. They want addition, subtraction, and multiplication for sure. If you can and have time, they would pay more for division to also be implemented.

The input will be two polynomials in string form:
"X^5+2X^2+3X^3+4X^4"
"2X^2+4X"

The output will should be:
Sum: X^5 + 4.0 X^4 + 3.0 X^3 + 4.0 X^2 + 4.0 X
Difference: X^5 + 4.0 X^4 + 3.0 X^3 -4.0 X
Product: 2.0 X^7 + 12.0 X^6 + 22.0 X^5 + 16.0 X^4 + 8.0 X^3
Quotient: 0.5 X^3 + X^2 -0.5 X + 2.0
Remainder: -8.0 X

Again the main focus is on sum, difference, and product. Quotient and Remainder are a plus

You will be using a **HashMap** (https://docs.oracle.com/javase/8/docs/api/java/util/HashMap.html) to accomplish this task. Implementation is up to you.

You must parse each string using the Java String API (https://docs.oracle.com/javase/8/docs/api/java/lang/String.html) It is important that you learn how to parse strings and break them down into the information that you need. You will probably spend 50% of your time parsing the strings into its individual terms.

If you do not know how to multiply/divide polynomials, please refer to a high school math text book. Or YouTube. To check if your output is correct, you can do the math yourself, or go on wolfram alpha.

You are supplied with an outline**. DO NOT CHANGE THE INTERFACE, UTILITY CLASS, OR THE MAIN METHOD.** You may change the two input strings for testing, but change it back to original state before you submit it.