Project 1 (10%)

Class BigInt.
Postfix calculator of arithmetic expressions with integer numbers of arbitrary length

1 Part: class BigInt (8%)

You have to create class BigInt for work with integer numbers of arbitrary length. The length of these numbers must be limited only by the size of operative memory. The inner representation of such a number is a ArrayList of digits. If necessary implement your faster version of ArrayList. You have to use usual (school) algorithms for arithmetic operations (addition, subtraction, multiplication, division, remainder).

Your class BigInt should be similar to class BigInteger from Java standard library. It means that you have to have following public methods and constructors:

- Constructor BigInt(String s), where s is a string representation of integer number in format: [+/-]<sequence of digits>. If string representation is incorrect constructor has to throw NumberFormatException.
- Method String toString(): returns string representation of integer number
- Method BigInt add(BigInt other)
- Method BigInt subtract(BigInt other).
- Method BigInt divide(BigInt other); throws ArithmeticException if other BigInt number is equal to 0.
- Method BigInt remainder(BigInt other); throws ArithmeticException if other BigInt number is equal to 0.
- Method int compareTo(BigInt other): returns -1 if current object is less than other; returns 0 if current object is equal to other; returns 1 if current object is greater than other;

You may add any number of private and private static methods you need to implement public methods of this class.

You have to check your corresponding methods of your class in online judge system http://informatics.mccme.ru/ : 132, 133, 131, 134, 135, 141, 142.

Grades:
2%: constructor, addition and subtraction of non-negative numbers; accepted problems 132, 133

4%: previous requirements + method compareTo, addition and subtraction of signed numbers; accepted problems 131, 134 .

6%: previous requirements + multiplication; accepted problems 135

8%: previous requirements + division and remainder; accepted problem 141, 142.

2 Part: Postfix Calculator. (2%)

You have to use your class BigInt to implement console calculator of arithmetic expressions in postfix notation for integer numbers of arbitrary length. Start from http://en.wikipedia.org/wiki/Reverse_Polish_notation to know better about postfix notation.

Your program has to read arbitrary number of lines (each line is arithmetic expression in postfix notation) and print result of this expression. End of standard input is signal to stop. Program has to catch all possible errors and print appropriate messages in each case;

Example:
Expression (Ctrl-Z: exit): 2 2 +
Result: 4
Expression (Ctrl-Z: exit) 2 0 /
Incorrect expression: division by zero
Expression (Ctrl-Z: exit) 2 2 2 *
Incorrect expression: to many operands
Expression (Ctrl-Z: exit): 2000000000000 2000000000000 + 2 *
Result: 8000000000000
Expression (Ctrl-Z: exit): one one +
Incorrect expression: invalid int - “one”
Expression (Ctrl-Z: exit): 2000 -2000 +
Result: 0
Expression (Ctrl-Z: exit): ^Z

Each line consists of operators and numbers separated by one or more whitespaces.
All possible operators: +, -, *, /, %
All numbers have format: [+/-]<sequence of digits>.