/\*

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\*/

package hugeinteger;

import java.lang.Math;

import java.util.Scanner;

//import java.util.\*;

//import java.lang.String;

//import java.util.Random;

//import java.math.BigInteger;

/\*\*

\*

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\*/

//public class HugeInteger {

//

// private char[] num;

// private int size;

// public HugeInteger(String val){

// int i;

// size = val.length(); //get the length of the input string

// if (size<=0)

// throw new NumberFormatException("empty list");

//

// if (val.charAt(0) == (char)45){

// num = new char[size];

// for(i=0;i<size;i++){

// num[i] = val.charAt(i); //copy from the input string to HugeInteger

// }

// }

// else{

// size++;

// num = new char[size];

// num[0] = (char)43;

// for(i=1;i<size;i++){

// num[i] = val.charAt(i-1);

// }

// }

// }

//

public class HugeInteger {

public char[] array;

public int size;

public int sign;

public HugeInteger()

{

array=null;

sign=0;

size=0;

}

public HugeInteger(String val)// throws IndexOutOfBoundsException

{

size=val.length();

// for(int j=0;j<val.length();j++)

// {//System.out.println("charAt is\n"+val.charAt(j));

// if(val.charAt(0)==45)

// { for(int k=1;k<size;k++)

// { if(val.charAt(j)>57 || val.charAt(j)<48)

// { System.out.println("charAt is\n"+val.charAt(j));}

// }

// }

// }

// System.out.println("Invalid Character");}

//the number have minus sign in the front

if(val.charAt(0)==(char)45)

{

sign=val.charAt(0);//sign=(int)val.charAt(0);

array=new char[size];

for(int i=1;i<size;i++)

{System.out.println("charAt is\n"+val.charAt(i));

if(val.charAt(i)>57 || val.charAt(i)<48)

{ System.out.println("charAt is\n"+val.charAt(i));

System.out.println("Invalid Character");

}

array[i]=val.charAt(i);//copy val's element to array

}

}

else //pos sign in the front

{

//size++;

sign=(char)43;//pos sign

array=new char[val.length()];

//array[0]=43;//+ sign

for(int i=1;i<val.length();i++)

{

if(val.charAt(i)>57 || val.charAt(i)<48)

{ //System.out.println("charAt is\n"+val.charAt(i));}

System.out.println("Invalid Character");

}

array[i]=val.charAt(i);

}

}

//empty

if(size<=0)

{

System.out.println ("Empty array");

}

}

public HugeInteger(int n)

{

if(n>=1)

{

size=n+1;

array=new char[size];

int rand=(int)(Math.random()\*2+0);//from 1 to 2

sign=(char)((rand==0)?45:43);

array[1]=(char)(Math.random()\*9+1+48);//1st digit different from 0

System.out.println("\*\*\*\*\*\*\*\*\*\*"+array[1]);

System.out.println("\n");

System.out.println("\*\*\*\*\*\*\*\*\*\*"+sign);

for(int i=2;i<size;i++)

{

array[i]=(char)(Math.random()\*9+0+48);

}

}

else

throw new NumberFormatException("size is less than 1");

}

public HugeInteger add(HugeInteger h)

{

HugeInteger add\_array=new HugeInteger();

int thislength=this.size;

int hlength=h.size;

int sum=0;

int carry=0;

int j=0;

//HugeInteger addition= new HugeInteger();

int longer=(thislength>hlength)?thislength+1:hlength+1;

//int[] array=new int[longer];

//

// add\_array.array=new char[longer];

add\_array.array=new char[longer];//create a new array

add\_array.size=longer;

int i=0;

if(this.sign==h.sign)//both - or both +

{

for(i=0;i<longer-1 && thislength-i-1>=1 && hlength-i-1>=1;i++)

{

if(thislength-i==0||hlength-i==0)

break;//out of range

sum=carry+this.array[thislength-i-1]+h.array[hlength-i-1]-96;

add\_array.array[longer-1-i]=(char)(sum%10+48);//carry

carry=sum/10;

}

}

add\_array.array[longer-1-i]=(char)(carry+48);

if(thislength>hlength)

{

for(j=i;j<thislength-1;j++)

{

sum=carry+this.array[thislength-j-1]-48;

add\_array.array[longer-1-j]=(char)(sum%10+48);//carry

carry=sum/10;

//add\_array.array[longer-1-j]+=this.array[thislength-1-j];

}

add\_array.array[longer-1-j]=(char)(carry+48);

}

else if (thislength<hlength)

{

//

for(j=i;j<hlength-1;j++)

{

sum=carry+h.array[hlength-j-1]-48;

add\_array.array[longer-1-j]=(char)(sum%10+48);//carry

carry=sum/10;

}

add\_array.array[longer-1-j]=(char)(carry+48);

}

///end creating new array

//do addition

if(this.sign==43&&h.sign==43)//++

{

///addition

add\_array.sign=43;

}

if(this.sign==45&&h.sign==43)//this=- h=+

{

add\_array=h.sub(this);//subtraction

}

if(this.sign==43&&h.sign==45)//this=+ h=-

{

//sub

add\_array=this.sub(h);

}

if(this.sign==45&&h.sign==45)//--

{

add\_array.sign=45;//sub

}

//size

return add\_array;

}

// public HugeInteger sub(HugeInteger h)

// {

//

// HugeInteger subtract=new HugeInteger(h.size-1);

// //this+, h-

// if(this.sign==43&&h.sign==45)

// {

// h.sign=43;//flip sign

// subtract=this.add(h);

// h.sign=45;

// this.sign=43;

// this.size=subtract.array.length;

// return subtract;

// }

// //this -, h +

// if(this.sign==45&&h.sign==43)

// {

// this.sign=43;

// subtract=h.add(this);

// this.sign=45;

// subtract.sign=45;

// subtract.size=subtract.array.length;

// return subtract;

// }

// //both negative

//

//

//

// }

public HugeInteger sub(HugeInteger h)

{

HugeInteger subtract=new HugeInteger();

int thislength=this.size;

int hlength=h.size;

int i=0;

int longer=(thislength>hlength)?thislength+1:hlength+1;

//int count=(thislength>hlength)?hlength:thislength;

// HugeInteger subtract= new HugeInteger(longer);

//int sub=0,carry=0;

if(this.sign==43&&h.sign==45)//this+,h-.....567-123

{

h.sign=43;

subtract=this.add(h);

h.sign=45;//-

this.sign=43;

this.size=subtract.array.length;

return subtract;

}

if(this.sign==45&&h.sign==43)

{

this.sign=43;

subtract=h.add(this);

this.sign=45;

subtract.sign=45;

subtract.size=subtract.array.length;

return subtract;

}

if(this.sign==43&&h.sign==43)

{

int count=(thislength>hlength)?hlength:thislength;

int len=(thislength>hlength)?thislength+1:hlength+1;

int sub=0;

int carry=0;

subtract.array=new char[len];

if(this.compareTo(h)==-1)

{

subtract=h.sub(this);

subtract.sign+=2 ;

subtract.size=subtract.array.length;

return subtract;

}

///////////////////

for( i=0;i<longer;i++)

{

if(thislength-i==0||hlength-i==0)

{

break;

}

sub=this.array[this.array.length-1-i]-h.array[h.array.length-1-i];

subtract.array[longer-1-i]+=sub;

//consider carry

if(subtract.array[longer-1-i]<0)

{

subtract.array[longer-2-i]-=1;

subtract.array[longer-1-i]+=10;

}

}

if(thislength>hlength)

{

for(i=i;i<this.array.length;i++)

{

if(subtract.array[longer-1-i]<0)

{

this.array[longer-2-i]-=1;

subtract.array[longer-2-i]-=1;

subtract.array[longer-1-i]+=10;

}

else

subtract.array[longer-1-i]+=this.array[longer-2-i];

}

if(subtract.array[longer-1-i]==-1)

{

subtract.array[longer-1-i]=0;

}

subtract.sign=43;

}

else

{

if(this.array[longer-1-i]>=0)

{

subtract.sign=43;

}

else subtract.sign=45;

}

}

if(this.sign==45&&h.sign==45)//////

{

this.sign=43;

h.sign=43;

if(this.compareTo(h)==1)

{

subtract=this.sub(h);

subtract.sign=45;

this.size=subtract.array.length;

return subtract;

}

else if(this.compareTo(h)==-1)

{

subtract=h.sub(this);

subtract.sign=45;

this.size=subtract.array.length;

return subtract;

}

}

subtract.size=subtract.array.length;

return subtract;

}

public HugeInteger multiply(HugeInteger h)

{

int t=Integer.parseInt(String.valueOf(this.array));

int h1=Integer.parseInt(String.valueOf(h.array));

long value=multiply(t,h1);

return value;

}

public long multiply(long x,long y)

{

int size1=getSize(x);

int size2=getSize(y);

int n=Math.max(size1,size2);

if(n<10)

return x\*y;

n=(n/2)+(n%2);//max length divided, round up

long m=(long)Math.pow(10,n);//multiplier

//do subtraction by formula

long b=x/m;

long a=x-(b\*m);

long d=y/m;

long c=y-(d\*n);

//compute subtract

long z0=multiply(a,c);//do recursion

long z1=multiply(a+b,c+d);

long z2=multiply(b,d);

return z0+((z1-z0-z2)\*m)+(z2\*(long)(Math.pow(10,2\*n)));

}

public int getSize(long num)

{

int c=0;

while(num!=0)

{

c++;

num/=10;

}

return c;

}

public int compareTo(HugeInteger h)

{

int thislength=this.array.length;

int hlength=h.array.length;

int i,s1,s2,j;

if(this.sign==43&&h.sign==45)

return 1;

if(this.sign==45&&h.sign==43)

return -1;

if(this.sign==43&&h.sign==43)//both postive

{

if(thislength>hlength)

return 1;

else if(thislength<hlength)

return -1;

else //same length

{

for(i=0;i<thislength;i++)

{

if(this.array[i]!=h.array[i])

break;

}

if(i==thislength)

return 0;

s1=this.array[i];

s2=h.array[i];

if(s1<s2)

return -1;

else return 1;

}

}

if(this.sign==45&h.sign==45)//both are negative

{

if(thislength>hlength)

return -1;

else if(thislength<hlength)

return 1;

else //same length

{

for(j=0;j<thislength;j++)

{

if(this.array[j]!=h.array[j])

break;

}

if(j==thislength)

return 0;

s1=this.array[j];

s2=h.array[j];

if(s1>s2)

return -1;

else return 1;

}

}

return 0;//??????

}

///////////////////////////////////////////////////////////////////////////////////////////////////

public String toString(){

String s;

if(array[0] == (char)45)

s = "-";

else

s = "+";

for(int i=1;i<size;i++) // if it is a positive number, delete the positive sign

s+=array[i];

return s;

}

public static void main(String[] args){

int i;

///test public HugeInteger(String val)

String x = "+100";

HugeInteger q1=new HugeInteger(x);

q1.toString();

System.out.println(q1.toString());

String p1="+999";

String p2="+111";

HugeInteger q2 = new HugeInteger(p1);

HugeInteger q3= new HugeInteger(p2);

HugeInteger n1;

n1=q2.sub(q3);

System.out.println("999+111= "+n1.toString());

}

}