CMPE150 PROJECT 1

1)Problem Description

In this problem we were asked to get 4 lines of input from the user which contains 3 variables and 1 expression to be calculated.Firstly, we had to change the expression by writing the variables' values into the expression . Actually it is not obligatory but i don't see any alternative method. After that part, we had to calculate the expression which includes only int, double, 4 operation signs and parantheses. Like simple algebra we had to print the result of that aritmetic expression. In conclusion, our goal was to print the unique value of the expression respecting operation's precedence and double-int differences.

2)Problem Solution

I defined 6 methods to divide the problem into several steps. 2 methods were "isDouble" and "deletingSpaces" which i used whenever i need to delete the spaces of the string or had to find if the char includes numbers or "."which indicates whether it can be double. These 2 methods were side methods but helped me considerably. Other 4 methods were "inputAlma", "parantez", "carpmaVeBolme", "toplamaCikarma" . It can be seen that they are respecting the arithmetic operations' precedence. I changed the string by putting the values of the variables, calculating the expressions inside the parantheses, performing multiplication and division , performing subtraction and summation respectively. So in the end i was able to find and print the result.

3)Implementation

```
import java.util.*;

	public class AT2019400288 {

		public static void main(String[] args) {
			Scanner console = new Scanner(System.in);
			// I take the inputs.
			String s1 = console.nextLine();
			String s2 = console.nextLine();
			String s3 = console.nextLine();
			String s  = console.nextLine();


			s = deletingSpaces(s); // I delete the spaces in string.
			s = inputAlma(s1,s2,s3,s); // I put the values into the
variables.
			s = parantez(s); //I calculate the results of the
expressions in parantheses..
			s = carpmaVeBolme(s); // Firstly I calculate the
multiplications and divisions.
			s = toplamaCikarma(s); // Lastly i calculate the
summation and subtraction.
			System.out.println(s); // I print the result.
		}
		public static String toplamaCikarma(String str) {
		       String result = str;
			int i = 0;
			int st6 = 1;
			int p =0; //This will be the last index of the first
number.
			while(isDouble(str.charAt(p))){

				p++;
			}
```

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                    double first = Double.parseDouble(str.substring(0,p));
//First number.

                    double sum = first;
                  while(i<str.length()){
                    if(str.charAt(i)=='+'){ //index 1 = i+1
                          int index1 = i+1;
                           int j = i+1; //j will be the last index of the
second
                                       //number later.

                           while(isDouble(str.charAt(j))) {

                                 j++;
                           }
                           int index2 = j; //Now it is the last index.
                           String adds = str.substring(index1,index2);
//Second number.
                           double add = Double.parseDouble(adds);
//Representation of it as double.
                                                                    //If
everyting is int i handle this later.
                           sum += add;
                     }
                     if(str.charAt(i)=='-'){ //Same logic with above. Only i
subtract them instead of
                                             // summing them. Therefore i
did not explain this if statement.
                          int index1 = i+1;
                           int j = i+1;

                           while(isDouble(str.charAt(j))) {

                                 j++;
                           }
                           int index2 = j;
                           String adds = str.substring(index1,index2);
                           double add = Double.parseDouble(adds);
                           sum -= add;
                     }
                     i++;
                  }
                  if(str.contains(".")){ //If it is double i return its
value as double.
                    result = Double.toString(sum);
                  }
                  else{  //If it is integer i return its value as integer.
                    int sumNext = (int)sum ;
                    result = Integer.toString(sumNext);
                  }

                   return result;
                   }

              public static String carpmaVeBolme(String str){
                    String result = str;
                    int i =0; // To use in while loop, i increased it at the
very end
                    while(i<str.length()){ //
                          if(str.charAt(i)=='*'){
```

```
                        // I will use these indexes to find the numbers
which will be multiplicated.
                        int index1 = 0; //Not useful for now.
                        int index2 = i; //Index2 is created.
                        int index3 = 0; //Not useful for now.
                        for(int j=i-1;;j--){
                              if(j<=0||j>=str.length()){ break;}
                              if(!isDouble(str.charAt(j))){
                             index1 = j+1; //Index1 created(Beginning of
the first number.)
                             break;
                              }
                        }
                        for(int k=i+1;;k++){
                              if(k==str.length()-1){
                               index3= k; break;       //Index3 created(End
of the first number.)
                              }
                              else if(!isDouble(str.charAt(k))){
                                    index3 = k; break; //Index3 created(End
of the second number.)
                              }
                        }

                        String s1 = str.substring(index1,index2); //First
number
                        String s2 = str.substring(index2+1,index3);
//Second number
                        String replaced = s1+"*"+s2; //Substring which will
be replaced with its value.
                        String mults = ""; //It will be the value.
                        if(!s1.contains(".")&&!s2.contains(".")){ //If it
is not double.
                         int mult =
Integer.parseInt(s1)*Integer.parseInt(s2);
                          mults = Integer.toString(mult); //Value of the
operation.
                        }
                        else { //If it is double.
                              double mult =
Double.parseDouble(s1)*Double.parseDouble(s2);
                              mults = Double.toString(mult); //Value of the
operation.
                        }
                        result = str.replace(replaced,mults); //I replace
the expression with its value.
                        result = deletingSpaces(result); // I delete spaces
if there is.
                        str = result;
                        i=0;
                        }        // If bitti
                        if(str.charAt(i)=='/'){ //Same logic with
multiplication.Same commands.
                                                //Except for multiplying
the numbers, divide them.This is the
                                                // Only difference.
Therefore i did not explain their meanings.
                              int index1 = 0;
                              int index2 = i;
                              int index3 = 0;
                              for(int j=i-1;;j--){
```

```
                                    if(j<=0||j>=str.length()){ break;}
                                    if(!isDouble(str.charAt(j))){
                                   index1 = j+1;
                                   break;
                                    }
                              }
                              for(int k=i+1;;k++){
                                    if(k==str.length()-1){
                                     index3= k; break;
                                    }
                                    else if(!isDouble(str.charAt(k))){
                                          index3 = k; break;
                                    }
                              }

                              String s1 = str.substring(index1,index2);
                              String s2 = str.substring(index2+1,index3);
                              String replaced = s1+"/"+s2;
                              String mults = "";
                              if(!s1.contains(".")&& !s2.contains(".")){
                              int mult = Integer.parseInt(s1)/
Integer.parseInt(s2);
                              mults = Integer.toString(mult);
                              }
                              else{
                              double mult =
Double.parseDouble(s1)/Double.parseDouble(s2);

                              mults = Double.toString(mult);    }


                              result = str.replace(replaced,mults);
                              result = deletingSpaces(result);
                              str = result;
                              i=0;
                        }
                        i++;

                  }
                  return result;

            }
             // In this method i calculate the expressions in the string.
            public static String parantez(String str) {
                  int count = 0; //It will be the number of the
parantheses.
                        for(int i =0;i<str.length();i++){
                        if(str.charAt(i)=='('){
                              count ++; //Here it gets its actual value.
                        }
                        }

            for(int j =0;j<count;j++){  //In each for iteration i calculate
1 parantheses.)
                                          // It works for nested parantheses
as well.
            int index1 = str.lastIndexOf('('); //I find the index of last
parantheses.
            String next = str.substring(index1);
            int index2 = next.indexOf(')');
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            String modified = next.substring(1,index2); //String between
parantheses.
            modified += ";"; // To circumvent outOfBounds error.
            modified = carpmaVeBolme(modified); //First step for its value.
            modified += ";"; // To circumvent outOfBounds error.

            modified = toplamaCikarma(modified); //Second and last step of
its value.
            int lastindex = str.length()-1;
            System.out.print(""); // To be honest i don't know its function
but
                                  // it prevented an error at some part. And
it doesn't hurt
                                 // my code and does not change the result.
            for(int i =index1;;i++){ // To find the index of the ")".
            if(str.charAt(i)==')'){
                   lastindex = i;
                  break;

            }

                 }
String substring = str.substring(index1,lastindex+1); // String including
parantheses
                                                       // and expression
inside them.

            str = str.replace(substring,modified); // Change the expression
with its value.
            }


            return str;

             }
    // In this method I take the variables' values.
public static String inputAlma(String s1,String s2,String s3,String s){
            s1 = deletingSpaces(s1); // I delete the spaces in the strings.
            s2 = deletingSpaces(s2);
            s3 = deletingSpaces(s3);
            String substring1 = ""; //These 3 strings
            String substring2 = ""; //will be the
            String substring3 = ""; //variable names.

            int index1 = s1.lastIndexOf("="); // I take these indexes to
divide
            int lasts1 = s1.indexOf(";"); // the string into variable and
its value
            int index2 = s2.lastIndexOf("=");
            int lasts2 = s2.indexOf(";");
            int index3 = s3.lastIndexOf("=");
            int lasts3 = s3.indexOf(";");

            if(s1.contains("double")){ //If it is double i start from 7th
character until
                  //the index of "=" to read its name.
             substring1 = s1.substring(6,index1); // variable1 name

            }
            //If it is int i start from 4th character until the index of
"="
```

```
        // to read its name. I do the same things for other strings as
well.
            else{
                  substring1 = s1.substring(3,index1);
            }
            if(s2.contains("double")){
                  substring2 = s2.substring(6,index2);

            }
            else{
                  substring2 = s2.substring(3,index2);
            }
            if(s3.contains("double")){
                  substring3 = s3.substring(6,index3);
            }
            else{
                  substring3 = s3.substring(3,index3); //same until here.
            }
            String newString1 = s1.substring(index1+1,lasts1); //Value of
1st variable
            String newString2 = s2.substring(index2+1,lasts2); //Value of
2nd variable
            String newString3 = s3.substring(index3+1,lasts3); //Value of
3rd variable
            //These if statements add ".0" if double does not contain
decimals like double a = 6;
            if(s1.contains("double")&&!s1.contains(".")){
                  newString1 += ".0";
            }
            if(s2.contains("double")&&!s2.contains(".")){
                  newString2 += ".0";
            }
            if(s3.contains("double")&&!s3.contains(".")){
                  newString3 += ".0";
            }


            s = s.replace(substring1,newString1); // Finally i change the
variable with its value.
            s = s.replace(substring2,newString2);
            s = s.replace(substring3,newString3);


             return s;
    }
            //This method deletes the spaces in the given string.
            public static String deletingSpaces(String s){
                  String result = "";
                  for(int i=0;i<s.length();i++)
                  if(s.charAt(i)!= ' '){

                        result += s.charAt(i);
                  }


                  return result;

            }
            // This method returns true if char contains a number or
dot.("1","2","3"...,"9" or ".")
            public static boolean isDouble(char ch1){
```

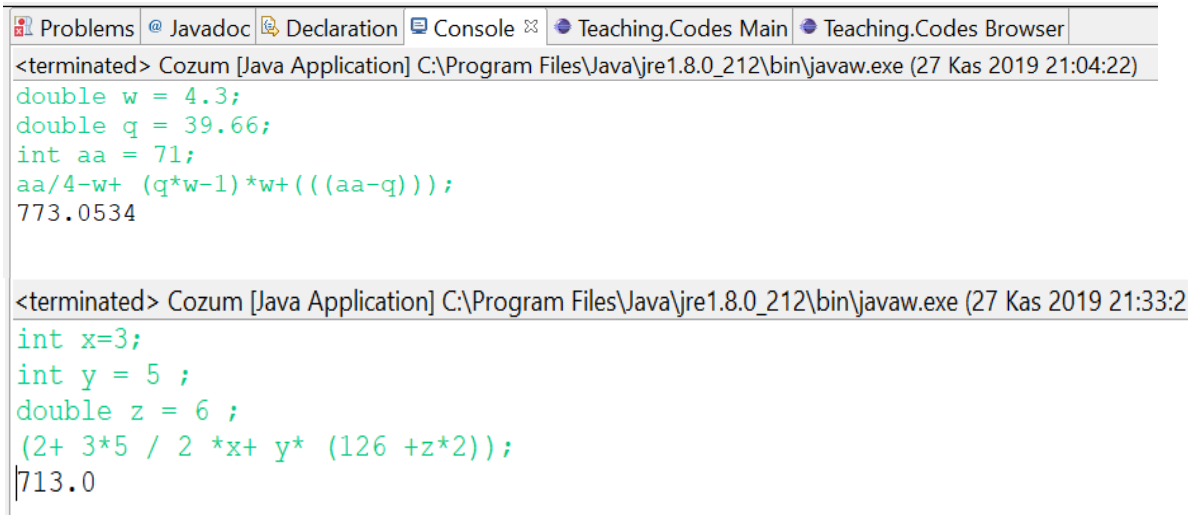
```
                boolean result = false;
                if(ch1>=48 && ch1<=57){
                        result = true;

                }
                else if (ch1=='.'){
                        result = true;
                }

                        return result;

                }
        }
```

4)Output of the Program



5)Conlusion

I tried many different types of expressions and all the examples in the assignment. All of them worked so i believe I solved the problem correctly, i can evaluate expressions respecting operations' precedence and considering int and double operations. Also I can use the variables correctly. I got the correct results as shown in the screenshots.