REPORT

JAVA Programming and Labs

Student ID : 1771008
Name : Minjeong Kim

MySet.java

[Code]

```java
package HW2;
import java.util.ArrayList;

public class MySet {

    public static int name_num=65; //for setting the set name, define the variable (I consider the ascii code number)

    private ArrayList<Integer> set; //set = {}
    private int set_length; //the size of the set
    String set_name; //set_name is assigned according to name_num and noascii variable

    public void makename() { //for making set name, use this function
        if(name_num<=90) {//since alphabet's ascii code is 65~90, consider this condition
            set_name = Character.toString((char)name_num); //to change integer to asciicode, change name_num's data type.
            name_num++; // A to Z
            }
        else {
            System.out.println("Set is Full"); // since. the set name range is A to Z, if the ascii over the Z(=90) the program is exit
            System.exit(0);
        }
    }

    public MySet() { //default constructor; construct an empty set
        set = new ArrayList<Integer>(); //initialize ArrayList
        set_length=0; //initialize set length
        makename(); //for initialize set name, use makename() method
    }

    public MySet(int num) { //constructs a set that contains only one element, the num
        set = new ArrayList<Integer>(); //initialize ArrayList
        set.add(num); //for this object contains one element, use add method
        set_length= 1; //initialize set length 1, because this object contains only one element
        makename(); //for initialize set name, use makename() method
    }


    public MySet(MySet s) {// one more constructor that returns a copy of the set s
        //set = new ArrayList<Integer>(s.set);  //the easy way copy of the set (but it is not homework's condition)
        set = new ArrayList<Integer>(); //initialize ArrayList
        for(int i=0; i<s.set_length; i++) { //because copy the set s, set the s.set's elements to this object by using the loop statement
            set.add(s.set.get(i)); //access the s set's ith element, and insert the this set
        }
        set_length = s.set_length; //Since this set is copyed by s set, the set length is same
        makename(); //for initialize set name, use makename() method
    }

    public void Empty() {//discards all the elements of the set
        for(int i=0; i<set_length; i++) {//Since remove all the set elements, using for loop
            set.remove(i); // use remove() method
        }
        set_length = 0; //Since, the remove() method haven't set_length-- code, assign the set_length to zero
    }

    public void Insert(int num) {//inserts the num into the set only if it is not in the set
        if(!IsPresent(num)) {//if the num is in set, don't insert the num
            set.add(num); //use ArrayList's add method
            set_length++; //plus set_length value
        }
    }

    public void Delete(int num) {// deletes the num from the set if it is in the set
        for(int i=0; i<set_length; i++) { // Since check the num is in set, use for loop
            if(num ==set.get(i)) { //if set element is equal to num return true
                set.remove(i); //use ArrayList's remove method
                set_length--; //minus set_length value
            }
        }
    }

    public boolean IsPresent(int num) { //return true if the element num is present in the set , false otherwise
        for(int i=0; i<set_length; i++) { //Since check the num is in set, use for loop
            if(num == set.get(i)) //if set element is equal to num return true
                return true; // Since satisfy the conditions, return true
        }
        return false; // Since didn't satisfy the condition, return false
    }

    public boolean IsSubset(MySet s) { //return true if "s" is a subset of "this"
        if(s.set_length==0) { //{} is subset always
            return true; //return method
        }
        for(int i=0; i<s.set_length; i++) { //use for loop, to check the all the s set element is in this set
            if(!IsPresent(s.set.get(i))) //checking the s set element is in this set
                return false; // if s set element isn't in this set, return false
        }
        return true; // after for loop, we can check all the s set element is in this set
    }

    public boolean IsEqual(MySet s) { // return true if two sets "this" and "s" have the same elements
        for(int i=0; i<set_length; i++) { //check all the element using for loop
            if(!(s.IsPresent(set.get(i)))) // consider the case that two sets' all element is equal, but order is not equal. so use Ispresent() method
                return false; //if atleast 1 ispresent() method's return value is existed, it is not equal
        }
        return true; // all the element is equal, so return true
    }

    public int Size() { //return the size of this set
        return set_length; // constructor, Delete(), Insert() methods are considered set_length
    }


```

```
    public void Print() { // prints the elements in "this" set
        if(set_length==0) { //if set_length==0 (null set), Since the set_length is -1, occure the error. so set if statement
            System.out.print("{}"); // print {}
        }else { //general case
            System.out.print("{"); // for satisfy the print format, print {
            for(int i=0; i<set_length-1; i++) {//to access set's all value use for loop
                System.out.print(set.get(i)+", "); // access set value, and satisfy the printf format
            }
            System.out.print(set.get(set_length-1)+"}"); // for satisfy the print format, last value is not print ','. So I separate with for loop
        }
    }

    public MySet Union(MySet s) { //return the union of two sets "this" and "s"
        MySet union = new MySet(this); //initialize new Myset, contents are copy by "this"
        for(int i=0; i<s.set_length; i++) { //to access set's all value, use for loop
            union.Insert(s.set.get(i)); //Use Insert method, because the method is not overlap elements
        }
        return union; // return the result MySet type value
    }

    public MySet Intersection(MySet s) { // return the intersection of two sets "this" and "s"
        MySet result = new MySet(); //initialize new MySet
        for(int i=0; i<s.set_length; i++) { // to access set's all value, use for loop
            if(IsPresent(s.set.get(i))) { //if Ispresent method result is true,
                result.Insert(s.set.get(i)); //Since Ispresent conditions is true, insert the value
            }
        }
        return result; // return the result Myset type value
    }

    public MySet Diff(MySet s) {// return the difference "this - s", not "s - this"
        MySet result = new MySet(this); //initialize new Myset, contents are copy by "this"
        for(int i=0; i<set_length; i++) { //to access set's all value, use for loop
            if(s.IsPresent(set.get(i))) { //if Ispresent method result is true, its value is intersection value
                result.Delete(set.get(i)); //delete the intersection value
            }
        }
        return result; // return the result MySet type value
    }
} // end of public class "MySet"

```

[Code analysis]

<class field>

I set class field with 4 variable. name_num variable is static type, that class variable. It is shared value in class. so, I can use it as global variable. By using it, I can define set name through converting integer to char. If I converting int to char. The char value is ascii code. Set variable type is arraylist. So, each set's value is inserted in this set variable. The set_length variable is return the that number of element in object's set variable. Set_name variable is string type. That value is defined by converting name_num, class variable.

<constructor>

And class constructors are 3 type, according to the number of argument. First, default constructor, have not parameter. It is create an object that have no element in the set variable. So create empty arraylist, and set_length is defined by 0. Second constructor have parameter, type defined by integer. The set value of object ,made by this constructor, have element that is equal to parameter value. So, after create arraylist, add num in set. And set_length is defined by 1. Third constructor have parameter, type defined by MySet. The best way to construct is using code 'new ArrayList<Integer>(s.set);'. Howeer it it not satisfy homework condition, so using other way. Create new arraylist and assign set value. Since copy the parameter set, access the set value's element and add that element in this set value. And set_length is setting as equal to parameter set.

In every constructor's last line, the makename method execute. This method exist to convert integer to String for name_num's value type. By doing this, we can get the set name by A to Z, it is ascii code principle. If name_num value range off Z(91~), the set_name is strange. so I consider the maximum over, print message as "set is full" and system exit.

<method>

Now I explain method simply, Empty() method is remove all elements of the set. So, I use remove method of arraylist with for loop, and the set_length reset.

IsPresent() method is return true if the parameter num is present in this object's set. So I access all object's set element and check is in, by using for loop.

Insert() method is add element in set as parameter num. By using add method of arraylist, insert the num and set length value plus 1. At this time, every elements in the set are not overlap. So using ispresent method with if statement.

Delete() method is remove element in set as parameter num. by using remove method of arraylist, remove the num and set length value minus 1. By using for loop access every element of set, and judge if accessing value is equal to parameter num, If so remove that element. The reason why using for loop is to find the parameter num value's index in the set. Because, the remove method of arraylist consider the argument as index.

IsSubset() method is judge that parameter obejct's set is subset of this obeject's set. If so every elements of parameter object's set are in this object's set. So using for loop, access the every elements of parameter object's set, and judge by IsPresent() method. According in meaning return false of true, furthermore since the empty set is subset in anytime, add condition to judge.

IsEqual() method is judge that all the elements of parameter object's set are equal to elements of this object's set. So using for loop, access the every elements, and if at least one return value of IsPresent() method is false, directly return false. Otherwise return true. Size() method is simple. In Insert(), Delete() method the set_length value is updated, so we have to return set_length value.

Print() method is print every elements of this object's set. To satisfy { , , } format, I divide System.out.print() statement. Because of this, I divided the case with set_length value is 0.

Union() method is return the MySet type result, union of two sets this object and parameter object. To set return value, type MySet, create MySet object copied this object by using third constructor. And insert every elements of parameter set to union set. Since Insert() method prevent duplication, the use insert() method only meets union meaning.

Intersection() method is return the MySet type result, intersection of two sets this object and parameter object. 쌔 set return value, create empty MySet object. Since the intersection meaning is finding same element of two sets, judge IsPresent method is true and insert the result set. if IsPresent method is true, that element is in two set.

Diff() method return is return the MySet type result, difference of this this object's set and parameter object's set. To set return value, type Myset, create MySet object copied this object by using third constructor. After access all elements of result object's set, the if statement's condition is true, delete that element. The difference meaning is minus this objects's set from intersection set of two sets. so delete the element, corresponded to intersection.

HW2_Test1.java

[Code]

```java
package HW2;
import java.util.ArrayList;

//Sample Test class with main method
public class HW2_Test1 {
    public static void main(String[] args) {

        System.out.println("Student ID 1771008: Minjeong Kim"); //information for me

        MySet a = new MySet(); // now MySet "a" is {}
        a.Insert(2); // a = {2}
        a.Insert(3); // a = {2, 3}

        MySet b = new MySet(a);// now MySet "b" is the same as MySet "a" = {2, 3}

        b.Insert(5); // b = {2, 3, 5}
        b.Delete(2); // b = {3, 5}
        a.Insert(10); // a = {2, 3, 10}
        a.Insert(8); // a = {2, 3, 10, 8}

        MySet c = a.Intersection(b); // c = {3}

        MySet d = a.Union(b); // d = {2, 3, 10, 8, 5}

        MySet e = d.Diff(c); // e = {2, 10, 8, 5}
        MySet f = c.Diff(d); // f = {}

        MySet g = new MySet(100);// now MySet "g" is {100}

        c.Empty(); // c = {}

        System.out.println("10 is in e : "+e.IsPresent(10)); // true;
        System.out.println("9 is in e : "+e.IsPresent(9)); // false;
        System.out.println("e is subset of d : "+ d.IsSubset(e));//true;
        System.out.println("d is subset of e : "+ e.IsSubset(d));//false;
        System.out.println("c is equal to f? : "+c.IsEqual(f)); // true;

        System.out.println();
        //check all MySet objects' values and size of set
        a.Print(); // {2, 3, 10, 8}
        System.out.println(" size of set a is "+a.Size()); // 4
        b.Print(); // {3, 5}
        System.out.println(" size of set b is "+b.Size());  // 2
        c.Print(); // {}
        System.out.println(" size of set c is "+c.Size());  // 0
        d.Print(); // {2, 3, 10, 8, 5}
        System.out.println(" size of set d is "+d.Size());  // 5
        e.Print(); // {2, 10, 8, 5}
        System.out.println(" size of set e is "+e.Size());  // 4
        f.Print(); // {}
        System.out.println(" size of set f is "+f.Size());  // 0
        g.Print(); // {}
        System.out.println(" size of set f is "+g.Size());  // 1

    }
}
```

[Output console]

```
Markers  Properties  Servers  Data Source Explorer  Snippets  Console  Debug
<terminated> HW2_Test1 [Java Application] C:₩Program Files₩Java₩jre-10.0.1₩bin₩javaw.exe (2018. 10. 18. 오후 1:09:58)
Student ID 1771008: Minjeong Kim
10 is in e : true
9 is in e : false
e is subset of d : true
d is subset of e : false
c is equal to f? : true

{2, 3, 10, 8} size of set a is 4
{3, 5} size of set b is 2
{} size of set c is 0
{2, 3, 10, 8, 5} size of set d is 5
{2, 10, 8, 5} size of set e is 4
{} size of set f is 0
```

[Code analysis]

This java file purpose is to test the MySet class are worked well. so source code have every constructor and method. by using method, check execution of set objects.

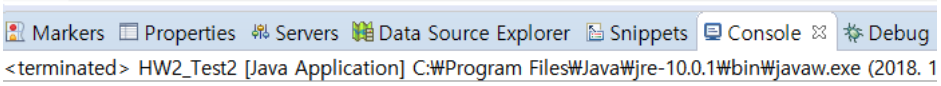
HW2_Test2.java

[Code]

```java
package HW2;
import java.util.Scanner;

public class HW2_Test2 {

    public static ArrayList<MySet> a = new ArrayList<MySet>(); //array of sets

    public static void stateprint() { // each iteration, print all sets
        System.out.println("\n[Current Status]");
        System.out.print("=> "); // for satisfy the print format, print =>
        if(a.size() ==0 )
            System.out.println("None");
        else {
            for(int i=0; i<a.size();i++) { // access each element's of array
                System.out.print(a.get(i).set_name+" = "); // print set name of element
                a.get(i).Print(); // print set elements
                if(i!=a.size()-1) { // at next the last elements dosen't require ,
                    System.out.print(", "); // to separate elements print ,
                }
            }
        }
        System.out.println(); //satisfy output format
    }

    static Scanner in = new Scanner(System.in); //scanner. to use in static method, set static type

    public static MySet finding(String name) { //finding the set by set name
        for(int i=0; i<a.size();i++) { //to fine the set name, access each element's of array
            if(a.get(i).set_name.equals(name)) { //if accessed set name is equal to name the condition is satisfied
                return a.get(i); //return the MySet value, name is correct
            }
        }
        System.out.println("Wrong Input! program exit!"); //if the correct value is not exist, exit program.
        System.exit(0); // program exit.
        return null; //default return value
    }

    public static void CreateEmptySet() { //case1 : new empty set
        MySet new_set = new MySet(); //make new MySet type value by using default constructor
        a.add(new_set); //insert new_set in array, consisted of sets
        System.out.println("=> Set "+new_set.set_name+" is created"); //for satisfying the output, print the state
    }

    public static void CreateExistingSet() { // case2 : new empty set that is equal to existing set
        System.out.print("-From which set?: "); //question about what is copy set
        String str1 = in.next(); // input user's answer
        MySet a1 = finding(str1); //by using finding method, find and assign the MySet that the name is equal to str1
        MySet new_set2 = new MySet(a1); //make new MySet type value by using constructor that argument exist.
        a.add(new_set2); // insert new_set in array, consisted of sets
        System.out.println("=> Set "+new_set2.set_name+" is created"); //for satisfying the output, print the state
    }

    public static void InsertNum() {// case3 : insert number
        System.out.print("-Type a number: "); // question about what is number to type
        int num = in.nextInt(); // input user's answer
        System.out.print("-Which set? "); // question about what is set to insert element
        String str3 = in.next(); // input user's answer
        MySet new_set3 = finding(str3); // assign the finding value in new_set3. the finding method return the MySet that the name is equal to str3
        new_set3.Insert(num); //insert number in new_set set. by using insert method we can access to plus the set_length
        System.out.println("=> Set "+str3+" is updated"); //for satisfying the output, print the state
    }

    public static void DeleteNum() {// case4 : delete number
        System.out.print("-Type a number: "); // question about what is number to type
        int num4 = in.nextInt();// input user's answer
        System.out.print("-Which set? "); // question about what is set to delete element
        String str4 = in.next(); // input user's answer
        MySet new_set4 = finding(str4);// assign the finding value in new_set4. the finding method return the MySet that the name is equal to str4
        new_set4.Delete(num4); //Delete number in new_set4 set. by using delete method we can access to minus the set_length
        System.out.println("=> Set "+str4+" is updated"); //for satisfying the output, print the state

    }

    public static void UnionSets() { // case 5 : union of two sets
        System.out.print("-Specify two sets: "); // question about what are sets to union
        String str5_1 = in.next(); // input user's answer
        String str5_2 = in.next(); // input user's answer
        MySet new_set5_1 = finding(str5_1); // assign the finding value in new_set5_1. the finding method return the MySet that the name is equal to str5_1
        MySet new_set5_2 = finding(str5_2); // assign the finding value in new_set5_1. the finding method return the MySet that the name is equal to str5_2
        System.out.print("=> "+str5_1+" ∪ "+str5_2+" = "); //for satisfying the output, print the state
        (new_set5_1.Union(new_set5_2)).Print(); //Since the return value of union is MySet type, so it can use print method by combining with MySet type.
        System.out.println(); // satisfy output format

    }

    public static void IntersectionSets() {// case 6 : intersection of two sets
        System.out.print("-Specify two sets: "); // question about what are sets to union
        String str6_1 = in.next();  // input user's answer
        String str6_2 = in.next();  // input user's answer
        MySet new_set6_1 = finding(str6_1); // assign the finding value in new_set6_1. the finding method return the MySet that the name is equal to str6_1
        MySet new_set6_2 = finding(str6_2); // assign the finding value in new_set6_2. the finding method return the MySet that the name is equal to str6_2
        System.out.print("=> "+str6_1+" ∩ "+str6_2+" = "); //for satisfying the output, print the state
        (new_set6_1.Intersection(new_set6_2)).Print(); //Since the return value of intersection is MySet type, so it can use print method by combining with MySet
        System.out.println(); // satisfy output format

    }
```

```java

    public static void DifferenceSets() {// case7 : difference of two sets
        System.out.print("-Specify two sets: ");// question about what are sets to union
        String str_1 = in.next(); // input user's answer
        String str_2 = in.next(); // input user's answer
        MySet new_set_1 = finding(str_1); // assign the finding value in new_set_1. the finding method return the MySet that the name is equal to str_1
        MySet new_set_2 = finding(str_2);// assign the finding value in new_set_2. the finding method return the MySet that the name is equal to str_2
        System.out.print("=> "+str_1+" - "+str_2+" = "); //for satisfying the output, print the state
        (new_set_1.Diff(new_set_2)).Print();//Since the return value of difference is MySet type, so it can use print method by combining with MySet type.
        System.out.println(); // satisfy output format
    }

    public static void SizeOfSet() {//case 8: size of set
        System.out.print("-Which set? "); //question about what is set to find size
        String str = in.next(); // input user's answer
        MySet new_set = finding(str); // assign the finding value in new_set. the finding method return the MySet that the name is equal to str
        System.out.println("=> Size of Set "+str+" is "+new_set.Size()); //for satisfying the output, print the state //use size() method find the number of set
    }

    public static void PrintSet() {//case 9: print set's all element
        System.out.print("-Which set? "); //question about what is set to find size
        String str = in.next(); // input user's answer
        MySet new_set = finding(str); // assign the finding value in new_set. the finding method return the MySet that the name is equal to str
        System.out.print("=> "+str+" = "); //for satisfying the output, print the state
        new_set.Print(); //use print method by combining with MySet type.
        System.out.println(); //satisfy output format
    }


    public static void main(String[] args) {
        System.out.println("[HW #2]"); //it is Homework 2
        System.out.println("Student Id 1771008: Minjeong Kim"); //information for me


        int input; // the variable to save the case number

        stateprint(); // in the starting point, print set state.

        do { //if input number is not 10, print the case of input (menu)
            System.out.println("==== Menu ===="); //set operation case menu print
            System.out.println("1) Create a new empty set"); //it is explanation of case 1
            System.out.println("2) Create a new set from an existing set"); //it is explanation of case 2
            System.out.println("3) Insert number to a set"); //it is explanation of case 3
            System.out.println("4) Delete number from a set"); //it is explanation of case 4
            System.out.println("5) Query the union of two sets"); //it is explanation of case 5
            System.out.println("6) Query the intersection of two sets"); //it is explanation of case 6
            System.out.println("7) Query the difference of two sets"); //it is explanation of case 7
            System.out.println("8) Query the size of a set"); //it is explanation of case 8
            System.out.println("9) Print all the elements in a set"); //it is explanation of case 9
            System.out.println("10) Exit"); //it is explanation of case 10
            System.out.println("-----------------------------------------------"); //divide menu print and user's input
            System.out.print("? "); // in the next, user select the menu
            input = in.nextInt(); //save the selected menu number in input variable
            switch(input) { // classify the case
            case 1://case1 : new empty set
                CreateEmptySet(); //link method : create empty set
                break;//case end

            case 2:// case2 : new empty set that is equal to existing set
                CreateExistingSet(); //link method : create set that equal to existing set
                break;//case end

            case 3:// case3 : insert number
                InsertNum(); //link method : insert the num to set
                break;//case end

            case 4:// case4 : delete number
                DeleteNum(); //link method : delete the num to set
                break;//case end

            case 5:// case 5 : union of two sets
                UnionSets(); //link method : show union of two sets
                break;//case end

            case 6:// case 6 : intersection of two sets
                IntersectionSets(); //link method : show intersection of two sets
                break;//case end

            case 7:// case7 : difference of two sets
                DifferenceSets(); //link method : show difference of two sets
                break;//case end

            case 8://case 8: size of set
                SizeOfSet(); //link method : show size of set
                 break;//case end

            case 9://case 9: print set's all element
                PrintSet(); //link method : show print set's elements
                break;//case end

            case 10://case 10 : exit program
                System.exit(0); // exit program
                break;//case end
            }
            stateprint(); // in every looping, print current set state.
        }while(true); // first, i set the condition of input != 10. but it dosen't need, since the case 10 exit program,

    }
}
```

[Output console]




```
<terminated> HW2_Test2 [Java Application] C:₩Program Files₩Java₩jre-10.0.1₩bin₩javaw.exe (2018. 1
[HW #2]
Student Id 1771008: Minjeong Kim

[Current Status]
=> None

==== Menu ====
1) Create a new empty set
2) Create a new set from an existing set
3) Insert number to a set
4) Delete number from a set
5) Query the union of two sets
6) Query the intersection of two sets
7) Query the difference of two sets
8) Query the size of a set
9) Print all the elements in a set
10) Exit
--------------------------------------------------
? 1
=> Set A is created

[Current Status]
=> A = {}
==== Menu ====
1) Create a new empty set
2) Create a new set from an existing set
3) Insert number to a set
4) Delete number from a set
5) Query the union of two sets
6) Query the intersection of two sets
7) Query the difference of two sets
8) Query the size of a set
9) Print all the elements in a set
10) Exit
--------------------------------------------------


? 3
-Type a number: 10
-Which set? A
=> Set A is updated

[Current Status]
=> A = {10}
--------------------------------------------------
? 2
-From which set?: A
=> Set B is created

[Current Status]
=> A = {10}, B = {10}
--------------------------------------------------
? 3
-Type a number: 1
-Which set? B
=> Set B is updated

[Current Status]
=> A = {10}, B = {10, 1}
--------------------------------------------------
? 7
-Specify two sets: A B
=> A - B = {}

[Current Status]
=> A = {10}, B = {10, 1}
```

```
-------------------------------------------------
? 7
-Specify two sets: B A
=> B - A = {1}

[Current Status]
=> A = {10}, B = {10, 1}
-------------------------------------------------
? 3
-Type a number: 3
-Which set? A
=> Set A is updated

[Current Status]
=> A = {10, 3}, B = {10, 1}
-------------------------------------------------
? 3
-Type a number: 12
-Which set? B
=> Set B is updated

[Current Status]
=> A = {10, 3}, B = {10, 1, 12}
-------------------------------------------------
? 4
-Type a number: 1
-Which set? B
=> Set B is updated

[Current Status]
=> A = {10, 3}, B = {10, 12}
-------------------------------------------------
? 5
-Specify two sets: A B
=> A ∪ B = {10, 3, 12}

[Current Status]
=> A = {10, 3}, B = {10, 12}
-------------------------------------------------
? 6
-Specify two sets: A B
=> A ∩ B = {10}

[Current Status]
=> A = {10, 3}, B = {10, 12}
-------------------------------------------------
? 8
-Which set? B
=> Size of Set B is 2

[Current Status]
=> A = {10, 3}, B = {10, 12}
-------------------------------------------------
? 9
-Which set? A
=> A = {10, 3}

[Current Status]
=> A = {10, 3}, B = {10, 12}
-------------------------------------------------
? 10
```

Since its scroll is too long, I skip the menu output.

[Code analysis]

This java file's purpose is making program administrate all set object. In test1.java file, in order to see the set method, I created, I had to know the Java code and write the content into the source file. However in this test2.java file, during a program running in the console, user can easily see various operations related to the set as keyboard input. So for this assignment, depending on the keyboard input, coding was required to execute the method. By doing this, I make methods bundle of appropriately used MySet class's method.

'a' variable, static type, that class variable. It is shared value in class. so, I can use it as global variable. The 'a' variable is an array of MySet type, which is an array that store the created sets. stateprint() method's purpose is print all the sets in the 'a' variable. Basically using Print() method of MySet, and show set_name. In order to statisfy the output format add some condition and println statements. The reason why Scanner objects are defined by static is to use static method as well as the main method. And finding() method purpose is to find the MySet object to name of MySet object. if the parameter name is not exist in 'a' arraylist, program exit, since user input wrong.

Using do while loop, iterate until the input value is 10. And every looping , print current set state using stateprint() method. Divide the case according to the input value and execute the method for each meaning.

Let's explain every method in the switch statement. Since there are many duplicate methods and the explanation is repeated, they are tabulated.

case	method name	process
1	CreateEmptySet()	1. create new object / 2. append the object in set array / 3. result output
2	CreateExistingSet()	1. receive user input / 2. find set with name / 3. create new object 4. append the object in set array / 5. result output
3	InsertNum()	1. receive user input / 2. find set with name / 3. insert number to set 4. result output
4	DeleteNum()	1. receive user input / 2. find set with name /
5	UnionSets()	1. receive user input / 2. find set with name / 3. result output with using union operation
6	IntersectionSets()	1. receive user input / 2. find set with name / 3. result output with using intersection operation
7	DifferenceSets()	1. receive user input / 2. find set with name / 3. result output with using difference operation
8	SizeOfSet()	1. receive user input / 2. find set with name / 3. result output with set size value
9	PrintSet()	1. receive user input / 2. find set with name / 3. result output with using Print() method of object
10	X	in the main, System.exit(0)

[What I learned from this homework]

<ArrayList copy>

In the MySet class I define the set type ArrayList. In third constructor, I wanted to know how to be efficient. So, I search the Java grammar the result is successful. There are two way to copy all elements of ArrayList.

1. addAll(list) / addAll(index, list)

```
// previously ArrayList b1 is defined as b1 = {1,2,3,4,5}
ArrayList<T> a1 = new ArrayList<T>(); //create empty ArrayList
a1.addAll(b1); // a1 = {1,2,3,4,5}
```

Lecture note for reference. It is added all elements from the given list to this list. Using this way, first, initialize new empty ArrayList a1, and use addAll method to a1 with setting the copy array. At the end of the ArrayList, or inserts them at the given index.

2. ArrayList<T> a1 = new ArrayList<T>(ArrayList<T>)

```
// previously ArrayList b1 is defined as b1 = {1,2,3,4,5}
ArrayList<T> a1 = new ArrayList<T>(b1); //create ArrayList
//a1 = {1,2,3,4,5}
```

For searching. When create ArrayList object, write the ArraList<T> type instance in the bracket. So, the a1 ArrayList elements are same as b1 ArrayList.

It was amazing to be able to copy all the contents of the element in one line!! But I could not use it because there was a restriction of ArrayList method on my homework.

<Method return type>

I use many method in this homework. This homework was mainly about method. Conceptually I knew that I could write methods nested (ex: android studio). In this opportunity I felt it was convenient to actually try.

When using method, Note the method return type. Even though the semantics are corret, it is necessary to keep the order of access because the method's return type is defined.

```
result.Insert(s.set.get(i)); //MySet.java line 127

//result : MySet
//.Insert() method is MySet method, return value is void // parameter type : Integer
//result.Insert() : void

//s : MySet
//s.set : ArrayList
//.get() method is ArrayList method, return value is Integer
//s.set.get() :  Integer (for the reason ArrayList<Integer>)

(new_set_1.Union(new_set_2)).Print(); //HW_Test2.java line 82

//new_set_1 : MySet
//.Union() method is MySet method, return value is MySet //parameter type:MySet
//new_set1.Union() : MySet
//.Print() method is MySet method, return value is void
```

When using method nested, the return type of the previous method is must equal to method type.