

Assignment 10

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1. Compiled code Name.java:

```
package com.gmu.rmohod;

import java.util.*;
import java.util.HashSet;
import java.util.Set;

public class Name {

    private final String first, last;

    public Name(String first, String last) {
        this.first = first;
        this.last = last;
    }

    public boolean equals(Object o) {
        if (!(o instanceof Name))
            return false;
        Name n = (Name)o;
        return n.first.equals(first) && n.last.equals(last);
    }

    public static void main(String[] args){
        Set s = new HashSet();
        s.add(new Name("Mickey", "Mouse"));
        System.out.println(s.contains(new Name("Mickey", "Mouse")));
    }
}
```

2. Observed output of compiled code:

false

3. Problem:

1. The failure to override the hashCode method. According to the contract every class that overrides equals must override hashCode. Failure to do so prevents class from functioning properly in conjunction with all hash based collections, including HashMap, HashSet and Hashtable.
Here code thus gives wrong result with the equals method returning false while checking the reflexivity condition.

2. The failure to override the toString method (if clients tries to print the object).
Here, if client tries to print the Name using toString method, the incorrect (address value) value would be printed.

Eg: `System.out.println(s.toString());` or `System.out.println(s);`
would print as: `[com.gmu.rmohod.Name@a683406e]`

4. Fixed problem with the implementation

Fix for Problem 1:

```
@Override
    public int hashCode() {
        int result = 1;
        result = result * 31 + first.hashCode();
        result = result * 31 + last.hashCode();
        return result;
    }
```

Observed output of fixed code:

true

Fix for Problem 2:

```
@Override public String toString() {
    String result = "";
    result = first+","+last;
    return result;
}
```

Observed output of fixed code:

`System.out.println(s.toString());` or `System.out.println(s);`

would print as: `[Mickey,Mouse]`

Fixed complied code:

```
package com.gmu.rmohod;

import java.util.*;
import java.util.HashSet;
import java.util.Set;

public class Name {

    private final String first, last;
```

```

    public Name(String first, String last) {
        this.first = first;
        this.last = last;
    }
    @Override
    public int hashCode() {
        int result = 1;
        result = result * 31 + first.hashCode();
        result = result * 31 + last.hashCode();
        return result;
    }
    @Override
    public boolean equals(Object o) {
        if (!(o instanceof Name))
            return false;
        Name n = (Name)o;
        return n.first.equals(first) && n.last.equals(last);
    }
    @Override public String toString() {
        String result = "";
        result = first+","+last;
        return result;
    }
    public static void main(String[] args){
        Set s = new HashSet();
        s.add(new Name("Mickey", "Mouse"));
        System.out.println(s.contains(new Name("Mickey","Mouse")));
        System.out.println(s);
    }
}

```