Foundations of Computer Science 2

Homework Exercises 2

1. For the Java code given below do the following:
   a. Outline where static type checking occurs during code compilation. Explain what happens in each instance.
   b. Illustrate where copy semantics applies and where reference semantics applies and demonstrate the impact of the different types of semantics in memory when the program is executed.
   c. When will garbage collection take place?
   d. For each statement in the program (excluding the System.out.println() statements), use a diagram to illustrate what happens in memory when the program is executed. Clearly distinguish between Heap and Stack memory.
   e. What is the output of the code?

import java.util.Arrays;

import java.util.Random;


```java
public class AddEx2 {

    public static void main(String[] args){
        //Primitive Types
        char x='a';
        char y='b';
        System.out.println(x);
```

```java
        System.out.println(x +" " + y);
        x=y;
        System.out.println("" + x +" " +y);


        //Arrays
        char[] myArray1 = {'a', 'b','c','d','e'};
        char[] myArray2 = {'f','g','h','i','j'};
        char[] myArray3=myArray1;

System.out.println(Arrays.toString(myArray1));

System.out.println(Arrays.toString(myArray2));

System.out.println(Arrays.toString(myArray3));
        myArray2=myArray3;

System.out.println(Arrays.toString(myArray1));

System.out.println(Arrays.toString(myArray2));

System.out.println(Arrays.toString(myArray3));

        //Objects
        Random r1 = new Random(5);
        Random r2= new Random(5);
        Random r3=r1;
        r2=r1;
```

```java
        String s1= "abc";

        String s2 = "xyz";

        String s3= new String("abc");

        System.out.println(s1+ " "+ s2+ " " + s3);

        System.out.println("" + (s1==s2?"t":"f") +"
"+ (s1==s3?"t":"f") +" "+ (s2==s3?"t":"f") );


        s2="abc";

        System.out.println(s1+ " "+ s2+ " " + s3);

        System.out.println("" + (s1==s2?"t":"f") +"
"+ (s1==s3?"t":"f") +" "+ (s2==s3?"t":"f") );


        s1=s2;

        System.out.println(s1+ " "+ s2+ " " + s3);

        System.out.println("" + (s1==s2?"t":"f") +"
"+ (s1==s3?"t":"f") +" "+ (s2==s3?"t":"f") );


        s3= new String("xyz");

        System.out.println(s1+ " "+ s2+ " " + s3);

        System.out.println("" + (s1==s2?"t":"f") +"
"+ (s1==s3?"t":"f") +" "+ (s2==s3?"t":"f") );

            }

}
```