Rochester Institute of Technology
Department of Computer Science
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Midterm Exam 2

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Please make sure you have 7 pages in your exam including this cover page, printed 2-sided. The last page is blank.

Provide complete and concise answers. Try to limit yourself to the space below the question.

If you need more space, use the last page.

This exam has 5 questions, each worth 8 points, totalling 40 points.

Student Full Name: _____

Question 1

```
import java.util.*;

public class CollectionClass<T> {

    static String countWithList(List array, Collection<Integer> a, Collection<Integer> b) {
        array.addAll(a);
        array.addAll(b);
        return array.toString();
    }

    static String countWithMap(Map map, Collection<Integer> a, Collection<Integer> b) {
        for (Integer i:a) map.put(i,map.get(i)==null?1:(Integer)map.get(i)+1); //5
        for (Integer i:b) map.put(i,map.get(i)==null?1:(Integer)map.get(i)+1);
        return map.toString();
    }

    public static void main(String[] args)  {
        Collection<Integer> fastLookUp = new ArrayList<>();
        Collection<Integer> slowLookUp = new HashSet<>();
        for (int i=0; i<1000; i++) fastLookUp.add(i);
        for (int i=0; i<1000; i++) slowLookUp.add(i);
        System.out.println(slowLookUp.contains(999)); //1
        System.out.println(fastLookUp.contains(999)); //2

        HashMap<Integer,Integer> slowCounter = new HashMap<>();
        ArrayList<Integer> fastCounter = new ArrayList<>(1000);
        System.out.println(countWithList(fastCounter, slowLookUp, fastLookUp)); //3
        System.out.println(countWithMap(slowCounter, slowLookUp, fastLookUp)); //4
    }
}
```

Answer the following.

1. Between the two lines of code marked with in-line comments “1” and “2”, which one is faster? Why?

2. Between the two lines of code marked with in-line comments “3” and “4”, which one is faster? Why?

3. Explain what the line marked with in-line comment “5” is performing.

Question 2

```
public class Exceptions {
    int[] intArray = {0};
    public void runAndThrows() throws RuntimeException {
        try {
            try {
                intArray[1] = 1;
                System.out.println(intArray[0]);
            }
            catch (RuntimeException e) { System.out.println("inner block"); }
            finally {
                intArray[1] = 1;
                System.out.println(intArray[0]);
            }
        }
        catch (Exception e) { System.out.println("outer block"); }
    }

    public Exceptions run() {
        intArray[0] = 1;
//      intArray[1] = 2;
        return this;
    }


    public static void main(String[] args) { new Exceptions().run().runAndThrows(); }
}
```

Answer the following.

1. What will be the output of this program?

2. If the commented line is uncommented, what will happen? Explain.

Question 3

```
import java.io.*;

public class FileOperation {
    public static void main( String[] args ) {
        try ( BufferedReader inputReader = new BufferedReader( new FileReader( "in.txt" ) );
              PrintWriter outputWriter = new PrintWriter( new FileWriter( "out.txt" ) );) {
            String line;
            while ( ( line = inputReader.readLine() ) != null ) {
                if (line.matches(".*"+args[0]+".*")) //1
                    System.out.println(line); //2
                outputWriter.println( line ); //3
            }
        }
        catch( Exception e ) { System.out.println(e); }
    }
}
```

Answer the following questions.

1. Describe the functionality of the main method.

2. What is the line marked with the in-line comment “1” performing?

3. What is the line marked with the in-line comment “2” performing?

4. What is the line marked with the in-line comment “3” performing?

Question 4

```
public class Generics<T> {

    T value;
    Generics<T> next;

    public Generics(T value) { this.value = value; }
    public void setNext(Generics<T> next) { this.next = next; }
    public String toString() { return value.toString(); }

    public static void main(String[] args)  {
        Generics<? super String> instance = new Generics<String>("nothing here"); //1
        instance.setNext(new Generics("nothing there")); //2
        System.out.println(instance);
        System.out.println(instance.next);
    }
}
```

Answer the following question.

1. What is the output of this program?

2. Explain in detail if a compile-time type checking in the line marked with the in-line comment “1”.

3. Is the line marked with the in-line comment “2” valid java syntax? Is there any problem with this line?

Question 5

```
import java.io.*;

public class Serialization implements Serializable {
    static Object value = Integer.parseInt("0");

    static void read() {
        try (ObjectInputStream in = new ObjectInputStream(new FileInputStream("object.save"));) {
            Serialization o = (Serialization) in.readObject();
            System.out.println("Value = " + o.value);
            o.value = Integer.parseInt("42");
            System.out.println("Value = " + o.value);
        } catch (Exception e) { System.out.println(e.getMessage()); }
    }

    static void write() {
        try (ObjectOutputStream out = new ObjectOutputStream(new FileOutputStream("object.save"));) {
            Serialization o = new Serialization();
            out.writeObject(o);
        } catch (Exception e) { System.out.println(e.getMessage()); }
    }

    public static void main (String args[] ){
        write();
        read();
    }
}
```

Answer the following.

1. What is the output of this program?

2. Is the field ‘value’ included in the serialization process?

3. Why is the value “0” printed in the first println() call?

4. Is is allowed by java syntax to assign an Integer instance to an Object variable, as you see in the initialization of the ‘value’ field?

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