Rochester Institute of Technology

Department of Computer Science

CSCI-605, Spring '23

Midterm Exam 1

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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

```
public class MemoryModel {

    int o = 0;
    MemoryModel(int o) { o = this.o; }

    public MemoryModel change(MemoryModel o) {
        this.o = o.o;
        return this;
    }

    public String toString() { return String.valueOf(o); }

    public static void main(String[] args) {
        MemoryModel o = new MemoryModel(1);
        System.out.println(o);
        System.out.println(o.o);
        System.out.println(o.change(new MemoryModel(2)));
    }
}
```

Answer the following.

1. What is the output of this program?

2. Describe the implementation of the change() method.

3. In change() method, what does this.o refers to?

4. In change() method, what does o.o refers to?

5. Is there any problem in the constructor?

Question 2

```
public class StringLiterals {
    public static String getString() {
        return "12";
    }

    public static void main( String args[] ) {
        String stringA = "1" + "2";
        String stringB = "12";
        int intA = 2;
        String stringC = "1" + "2";
        String stringD = "1" + intA;

        System.out.println("" + ( stringD == "1" + "2")  ); //1
        System.out.println("" + ( stringD == "12" )  ); //2
        System.out.println("" + ( stringC.equals( "" + 10 + 2 ) ) ); //3
        System.out.println("" + ( "1" + "2" == "12" ? "false" : "true" ) ); //5
        System.out.println("" + ( stringA == stringB)  ); //5
        System.out.println("" + ( stringD.equals( 1 + "2" ) ) ); //6
        System.out.println( stringC == getString()); //7
        System.out.println("" + "1" + "2" == "12" ); //8
    }
}
```

Answer the following.

1. What is the output of this program?

2. Explain each line of the output.

Question 3

```
interface Contract {
    String scream();
}

abstract class Parent {
    final public String scream() { return "aaaaa"; }
}

public final class Child extends Parent implements Contract {
    public static void main(String[] args) {}
}
```

Answer the following questions.

1. Is the Child class required to implement scream() in this source code? Why?

2. Can the Child class override scream()? Why?

3. Can a subclass of Child be declared? Why?

4. Can we change the access modifier of scream() in Contract to private? Why?

Question 4

```
public class Inheritance extends InheritanceParent {
    private int counter;

    public static InheritanceParent increment(InheritanceParent o) {
        o.counter += 1;
        return o;
    }

    protected InheritanceParent increment() {
        counter++;
        return this;
    }

    public String toString() { return String.valueOf(counter); }

    public static void main(String[] args) {
        Inheritance child = new Inheritance();
        InheritanceParent parent = child.increment();
        System.out.println("" + parent.counter + " " + child.counter);
        parent.increment();
        System.out.println("" + parent.counter + " " + child.counter);
    }
}

class InheritanceParent {
    protected int counter = 10;

    protected InheritanceParent increment() {
        counter++;
        return this;
    }
}
```

Answer the following question.

1. What is the output of this code?

Question 5

```
public class SubClass extends SuperClass {

    private int value = 0;
    private SubClass(int value) { super.value = value; }

    private void increment() { value++; }
    public String toString() { return String.valueOf(value); }

    public static void main(String[] args) {
        System.out.println(new SubClass(1));
    }
}

class SuperClass {
    protected int value = 10;

    SuperClass() {} // MARKED
    SuperClass(int value) { this.value = value; }
}
```

Answer the following.

1. The output of this code is "0". How would you fix the code to make it print the value passed in the constructor call of SubClass?

2. Can the line with the comment "MARKED" be fully removed with no harm to the execution of this code? Why?

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