

25. (8 marks) You are given the statement:

```
String s1 = input.nextLine(); //where input is a Scanner object
```

Assuming the user enters *arbitrary* text as input; give the Java statement(s) required to complete the following tasks:

- a. Determine and store in a variable the total number of characters in the String.
- b. Determine and store in one String two copies of the first character in String s1 (i.e., if the first character is 'a', the new string should be "aa").
- c. Write a complete if statement that prints "I love COSC!" if s1 is "I am happy!".
- d. Create a new string s2 that contains only the last three characters of s1 (assume there are enough characters in s1 to accomplish this).

26. (5 marks) What is the output of the following code?

```
String s = "For this question, use logic really?";  
String t = s.charAt(0) + s.charAt(19) + s.charAt(16) + s.charAt(16);  
t = t + s.substring(s.length() - 2);  
System.out.println(t.toLowerCase());
```

27. (5 marks) Write appropriate JavaDocs for the following method header (do NOT write the method code).

```
public int maxValue(int[][] data)
```

28. (3 marks) There is a syntax or logic error in the code below. Identify how to correct it.

```
public class someClass{  
    private int data;  
    public someClass(int d){data = d;}  
    public someClass(int x){data = x;}  
}
```

29. (3 marks) There is a syntax or logic error in the code below. Identify how to correct it.

```
Polynomial p;  
p.compute(x);
```

30. (3 marks) There is a syntax or logic error in the code below. Identify how to correct it.

```
public class someClass{  
    private double dataField;  
    public someClass(double in){  
        double dataField = in;  
    }  
}
```

31. (8 marks) Consider the following classes:

```
public class ClassOne{
    private static int data;

    public ClassOne( ){ data++; }
    public int getData( ){ return data; }
}
public class ClassTwo{
    private int data;

    public ClassTwo(int d){ data = d; }
    public int getData( ){ return data; }
}
```

What is the output produced by the following statements:

```
ClassOne c1a = new ClassOne();
ClassOne c1b = new ClassOne();

System.out.println(c1a.getData());
System.out.println(c1b.getData());

ClassTwo c2a = new ClassTwo(5);
ClassTwo c2b = new ClassTwo(10);

System.out.println(c2a.getData());
System.out.println(c2b.getData());
```

32. (6 marks) Consider the aggregated Circle class and the Point class below:

```
public class Circle{
    private point center;
    private int radius;

    public Circle(Point c, int r)
        { center = c; radius = r; }

    public Point getCenter( )
    { return center; }
}

public class Point{
    private int x, y;

    public Point(int x, int y)
        { this.x = x; this.y = y; }

    public Point getX() { return x; }
    public int getY() { return y; }
}
```

a. (4 marks) Show the statement(s) required to create a new Circle object.

b. (6 marks) Identify any data leaks in the Circle class and rewrite the appropriate code to use “deep” copy and deep return instead of the shallow references.

33. (15 marks) Write a Java object class that matches the following UML description. Use comments to clarify any assumptions you are making. JavaDocs are NOT required. A tester class is NOT required.

BankAccount
<div>-number : int</div> <div>-balance : double</div> <div>-name : String</div>
<div>+BankAccount(number : int, balance : double, name : String)</div> <div>+BankAccount(b : BankAccount)</div> <div>+getName() : String</div> <div>+getBalance() : double</div> <div>+getNumber() : double</div> <div>+deposit(deposit : double) :</div> <div>+withdraw(debit : double) :</div> <div>+toString() : String</div> <div>+equals(obj2 : Object) : boolean</div>