Exam 2 - Written Part

Q1 Notes for the exam

0 Points

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1) You are *not* allowed use Eclipse for any part of this exam

2) There are 4 allowed Resources (and nothing more):

(i) OO Design Principles Handout
https://rhit-csse.github.io/csse220/Docs/Handouts/Basic_OO_Principles_for_CSSE220.pdf

(ii) UML Cheatsheet
https://rhit-csse.github.io/csse220/Docs/Handouts/UML_Cheatsheet.pdf

(iii) Box & Pointer Cheatsheet
https://rhit-csse.github.io/csse220/Docs/Handouts/drawing_box_and_pointer.pdf

(iv) A single double-sided 8.5 x 11" paper cheatsheet that you made for yourself

3) Academic honesty is taken seriously, dishonesty can result in a zero on this exam

4) In several places below, you will be asked to provide a UML diagram (or a recursive trace). The best option to give us a UML diagram below is to make it on plantUML using the link plantuml.com/plantuml and then saving the resulting png and uploading the png file for your submission to the question.

However, you may also draw your UML diagram by hand. You may this submit your diagram by scanning the document to a PDF.

Instructions for converting a file to PDF:

To upload a scanned sheet of paper from your phone and generate a PDF:

- Adobe Scan is a free document scan app that is available for both Android and IOS devices.
- Android: https://play.google.com/store/apps/details?id=com.adobe.scan.android&hl=en_US
- IOS: https://apps.apple.com/us/app/adobe-scan-digital-pdf-scanner/id1199564834

There are also options like the built in Google Drive app. You can hit the + icon and click Scan.

- Android: https://play.google.com/store/apps/details?id=com.google.android.apps.docs&hl=en_US
- IOS: https://apps.apple.com/us/app/google-drive/id507874739

Other alternatives for scanning can be found on page 1 and 2 here:

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- escope-static-assets.s3.amazonaws.com/help/submitting_hw_guide.pdf

HINT: If you have a file on your machine that is not in PDF form, you can usually opt to print the document and you should be able to save to a PDF from there.

In Windows, you must have Adobe installed (https://helpx.adobe.com/acrobat/using/print-to-pdf.html):

- Open a file in a Windows application
- Choose File > Print
- Choose Adobe PDF as the printer in the Print dialog box
- Click Print. Type a name for your file, and click Save

In MacOS:

- Open the file in Preview
- Select File > Export to PDF
- Choose the location and name to save the PDF

Q2 Small Design Problem

2 Points

You are given a problem statement below. You will then be asked some questions regarding this problem statement.

Several companies are tasked with tracking a complaint system for their services. We would like to create a generic complaint system that most companies can use. For such a system, we want to track individual customers, including their names, customer IDs, and their company status, which is something each company can use as a string in whatever way they wish. We also want to track "tickets." When a customer calls to complain about a specific issue, a ticket is created. Each ticket will have an ID, the date the ticket was created and the date that all the complaints of the ticket applies to. Note that if a customer wishes to complain about separate occasions, whether they have different dates, or the separate complaints are not related, a separate ticket must be created for each occasion. Each ticket may have several complaints

that relate to the same issue. Note also that ticket IDs are only unique for each customer, so to get a specific ticket, you need the customer ID and ticket ID to identify a unique ticket. Lastly, we want to track the various complaints that exist in the system. A complaint just needs an ID and a long description string to describe the specific complaint.

For the company, we want various ways of reporting on these complaints. Of course, we want to be able to print a specific ticket report, which contains each complaint in detail for a specific customer. But we would also like things like the following:

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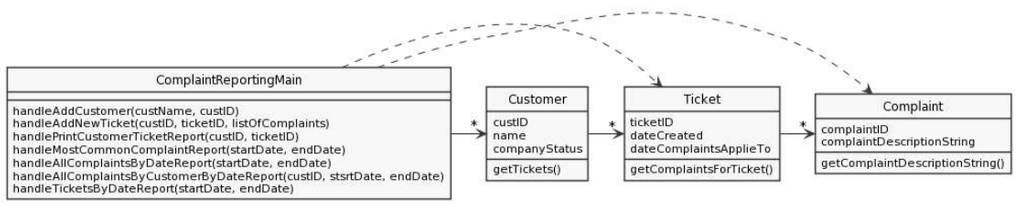
- Given a date range, print the most common complaint in that date range
- Given a date range, print all the complaints made in that date range across all customers
- Given a customer ID and a date range, print all the complaints made by that customer in that date range
- Given a date range, print out all ticket reports that were filed in that date range

Given the following UML diagram, there is a problem.



Q2.1 Coupling or Cohesion

1 Point

Would you consider this problem to be related more to Coupling or Cohesion (Hint: consider the design principle that is violated here)?

- (•) Coupling
- ( ) Cohesion

Q2.2 Design Fix

1 Point

Now, provide a UML diagram to propose a change that fixes the problem you identified in the previous part. To do this, go to plantuml.com/plantuml and create a UML diagram for this question (or you may draw it out by hand and submit a scan). When you are finished, save the image and upload the saved image below. To help get you started, you can click the following link or paste it into your browser address bar. The link will take you to the existing UML diagram (from above) on PlantUML. Once there, you can make changes as necessary rather than starting from scratch.
http://www.plantuml.com/plantuml/uml/bPBVJZ8n4CNl-nGRhlY-e8z0G8Y95w0HNg3PZjZGFvIER0mnIhIJBTFLc8tnffnsUdvpEkmAIIVgILDujg7JIVi6wUA0rsJRe

Sje6UeOk9R3ZjUDUygrSTZ8ErCPiUANf8yvR5NdjOD5azRF-DT_RmThJj6MXUIek6XcrMpY8zIjG-ABQdn3k15tV9y8CXZbr4OewFGMZY69wxrSJP89WiQZZdnjPtbrpwgqSoYIjRHYISe9Gd_TxpC6PWoJDuauDKKNP-pxZfduHWpQJozZwb0Ib1hDGSIpUogju1jiXtP60wKR3WLvbHrG4zyRZVBPIP_LaUWH4YXX5Fb0G00

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Q3 Big Design Problem

3 Points

Given the problem statement below, answer the following questions.

You are asked to program a simple shooter game. It is simple in the sense that while multiple players may play, they all see the same screen and the playing surface does not move during the entire game, and the background is simply a solid color. Each player may choose to be either a Circle or a Square, and the player may choose what color his/her shape will be. A player moves around the screen (and thus has an x, y position as well as an x, y velocity; the velocity is only non-zero for any player when the player is actively pressing and holding a movement direction), and when the player presses the space bar, for whatever direction the player is currently moving, a faster moving projectile will be shot in the same direction and it will travel until it either hits another player or leaves the screen, at which point is it removed from the program. If a player successfully hits another player with a projectile who is of the same shape (a circle hits a circle), the player receives 1 point. If a player hits another player who is of the opposite shape (a circle hits a square), the player receives 2 points. The player with the highest score when the game time runs out is the winner. The game time is displayed at the upper left hand corner of the screen.

The player movement is a little different for this game. The players will use the four directional arrows on their keyboards. However, there is a timer running in the background (displayed at the top right corner of the screen). This timer goes off every 30 seconds and affects the different shapes as follows:

- For a square, when the timer goes off, all arrow key directions are randomized. This means that all four directions are still available, but the up arrow key could move the player in ANY of the 4 directions when pressed. The same goes for all 4 arrow keys.
- For a circle, when the timer goes off, one of the four directions, chosen at random, will be "turned off" in the sense that for the next 30 seconds, that direction arrow does not work. We want a design that captures all these rules that will allow for the above game to be implemented.

Note that each shape is independent of the other shapes, meaning that at any one time, one circle may have the up arrow key turned off, while another circle may currently have the left arrow key turned off. Each piece chooses at random without the knowledge of any other piece of the same shape.

For this problem, and for simplicity, you can ignore a lot of the extra things, i.e., you can assume the timer is implemented elsewhere and that the animation is handled in some other component class not shown, which would display each object at its current position and redraw every 10 milliseconds. The projectiles are also dealt with elsewhere such that once the user shoots a projectile, some other part of the program determines when the projectile collides with another player and will call the appropriate method giving what shape was hit.

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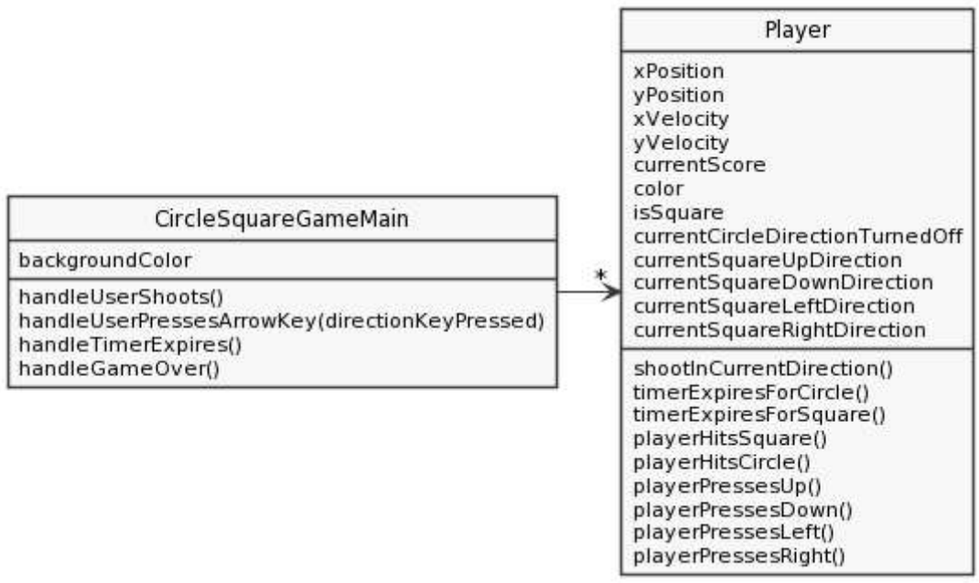
Q3.1 Solution A

1 Point

The following is one design for the problem statement given above. (*Note, the variable named "currentSquareUpDirection" is a variable that has 4 possible values. Each value is the ACTUAL direction the player moves when pressing the up arrow key. For example, if this value is "left", then when the user presses the up arrow key, the player goes left. This applies to the other directional arrow keys as well. Likewise, for circles, the field named currentCircleDirectionTurnedOff is the direction that the player currently turned off in the sense that when the player presses that direction, nothing changes.*)



The design above violates one or more of the OO Design Principles. Note, there may be a number principles that are violated, we are looking for the worst one(s).

What is/are the principle(s) violated?

3a
3b

Please explain your answer below:

The player class is obviously too large
Furthermore, it attempts to accomplish the job of both circle and square pla
yer

Q3.2 Solution B

1 Point

The following is one design for the problem statement given above.

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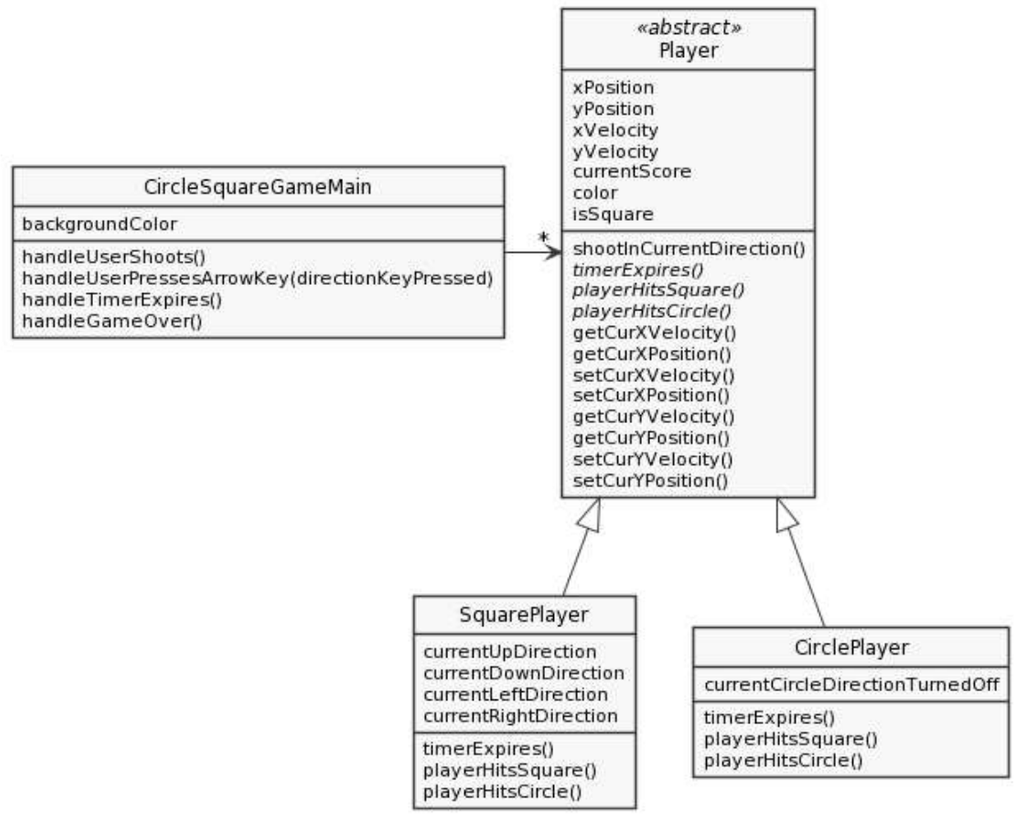

The design above violates one or more of the OO Design Principles. Note, there may be a number principles that are violated, we are looking for the worst one(s).

What is/are the principle(s) violated?

1b

Please explain your answer below:

The current direction of the player is not specified so the player could not k
now which direction to shoot in.

Q3.3 Your Solution

1 Point

Please provide a UML diagram of a design that fixes the problems of the previous solutions and does not violate any of the OO Design Principles. To

do so, you may go to plantuml.com/plantuml, or you may draw it by hand. In either case, please upload the file for your submission.

If you choose to use PlantUML, below are the links to Solution A and Solution B to help get you started.

Solution A:
http://www.plantuml.com/plantuml/uml/TPBTJi9048NlzoaQhj34Lp0OyCUeWGXuIsu7cB3TgJD
kzikMx72JRFzpdHwpioEn6IsLM6LRD6LcdMHYQyjX2UZQHLZjKWsHZOMvX-
LPhZN1RneTDcNUjTcksQgN3uclwmsskKMbW8ytn1v6LuSeHc32CWDC-
sUe1xco60yaWiIKSjJ-G8BuDjz6lf-
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ZFIAwysH9itq7jqubdGy9FT7axaZZcR_yzWryBATq0DwEO7Yrmcb1ItBFcaozLaJfi_Q5ErwJjwN
jiS3auB4sDmELLONy0

Solution B:
http://www.plantuml.com/plantuml/uml/dLBHJi8m57tlLomyeSd-
W2mOC6hKG0ICF9Rk0WrTEsyxOK7-tOwkOzZvuWifvzoTS-
x97Mf3qHIP87h7PKwHPf4sfG3xYvoT6IQerj688nCm-
omemWFDu9Lo6Ht9YhBT1bKXqv4I2icMobJ0GWFEjaePtRzfGLC4hK7V8QhzCvJzb2CmmvM
I4vpm3I3xcTk6XKIfCIG0kSwbXJGKI0Q32WAvkOCfCaDjLXgZIIX4dPI0xI81JZfYHbys858aWpC
-
ieMUTE8XyPgBmFm1TOc0D_uPjj2VvNOqLn7NQVsNGRn7DfOp0kKa4xMw_zwTLv_ZDKUSH

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Q4 Recursive Trace

1 Point

Given the recursive code below, we will ask you to provide both the output and the recursive trace of the method call.

```
1
2  public class RecursionQuestion {
3
4      public static void main(String[] args) {
5          String a = "1ab";
6          int[] b = {1, 3, -1};
7          String result = mystery(a, b, 0);
8          System.out.println("Result is: " + result);
9      }
10
11     public static String mystery(String a, int[] b, int curIndex) {
12         if(curIndex == a.length())
13             return "BASE";
14         if(Character.isDigit(a.charAt(curIndex))) { //returns true if character at position is digit [0-9]
15             System.out.println("a - curIndex: " + curIndex + " is digit...");
16             return a + mystery(a, b, curIndex+1);
17        } else if(b[curIndex] != -1) {
18             System.out.println("a - found number " + b[curIndex]);
19             String before = a.substring(0, curIndex);
20             String after = a.substring(curIndex+1);
21             a = before + b[curIndex] + after; //changes a at the current index to b at the same
22             return a + mystery(a, b, curIndex + 1);
23         } else {
24             System.out.println("found -1 in " + a.charAt(curIndex));
25             return "different" + mystery(a, b, curIndex + 1);
26         }
27     }
28
29 }
```

Please upload a scan of your recursive trace below:

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recursive trace.pdf Download Remove

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In the blank below, please give the output from the method call:

a - curIndex: 0 is digit...
a - found number 3
found - 1 in b
Result is: 1ab13bdifferentBase

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Q5 Exceptions

3 Points

Given the following functions, answer the following questions (the functions below will be given in the next parts as well).

```
40    public static int manageDataAndSend(int[] a, int b, char op) {
41        try {
42            if(op == '+')
43                return addResult(a, b);
44            else if(op == '*')
45                return multiplyResult(a, b);
46            else
47                throw new IllegalArgumentException();
48        } catch (ArithmeticException e) {
49            System.out.println("Managed to catch arithmetic issue");
50            return 0;
51        }
52    }
53
54    public static int addResult(int[] a, int b) {
55        if(b == 0)
56            throw new ArithmeticException();
57        int result = 0;
58        for(int i = 0; i < a.length; i++) {
59            result += (a[i] + b); //add b to each and add to sum
60        }
61        return result;
62    }
63
64    public static int multiplyResult(int[] a, int b) {
65        if(b > 15)
66            throw new ArithmeticException();
67        if(b < 0 && a[0] < a[1])
68            throw new IllegalStateException();
69
70        int result = 0;
71        for(int i = 0; i < a.length; i++) {
72            result += (a[i] * b); //multiply b to each and add up total
73        }
74        return result;
75    }
```

Q5.1 Part A

1 Point

Given the following main method, give the output that results from running the code.

```
5⊖    public static void main(String [] args) {
6         try {
7             int[] a = {3, 2, 1};
8             int res = manageDataAndSend(a, 20, '+');
9             System.out.println("1st Result is " + res);
10
11            res = manageDataAndSend(a, 0, '/');
12            System.out.println("2nd Result is " + res);
13
14            res = manageDataAndSend(a, -1, '-');
15            System.out.println("3rd Result is " + res);
16        } catch (IllegalArgumentException e) {
17            System.out.println("Main caught IAException first try");
18        }
19    }
```

For convenience, the functions needed are displayed again below:

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```
41        try {
42            if(op == '+')
43                return addResult(a, b);
44            else if(op == '*')
45                return multiplyResult(a, b);
46            else
47                throw new IllegalArgumentException();
48        } catch (ArithmeticException e) {
49            System.out.println("Managed to catch arithmetic issue");
50            return 0;
51        }
52    }
53
54⊖   public static int addResult(int[] a, int b) {
55        if(b == 0)
56            throw new ArithmeticException();
57        int result = 0;
58        for(int i = 0; i < a.length; i++) {
59            result += (a[i] + b); //add b to each and add to sum
60        }
61        return result;
62    }
63
64⊖   public static int multiplyResult(int[] a, int b) {
65        if(b > 15)
66            throw new ArithmeticException();
67        if(b < 0 && a[0] < a[1])
68            throw new IllegalStateException();
69
70        int result = 0;
71        for(int i = 0; i < a.length; i++) {
72            result += (a[i] * b); //multiply b to each and add up total
73        }
74        return result;
75    }
```

Please type the resulting output below:

Enter your answer here

Q5.2 Part B

1 Point

Given the following main method, give the output that results from running the code.

```
5⊖    public static void main(String [] args) {
6         try {
7             int[] a = {3, 2, 1};
8             int res = manageDataAndSend(a, 10, '*');
9             System.out.println("4th Result is " + res);
10
11            res = manageDataAndSend(a, 0, '+');
12            System.out.println("5th Result is " + res);
13        } catch (IllegalArgumentException e) {
14            System.out.println("Main caught IAException second try");
15        }
16    }
```

For convenience, the functions needed are displayed again below:

```
40⊖    public static int manageDataAndSend(int[] a, int b, char op) {
41        try {
42            if(op == '+')
43                return addResult(a, b);
44            else if(op == '*')
45                return multiplyResult(a, b);
46            else
47                throw new IllegalArgumentException();
48        } catch (ArithmeticException e) {
49            System.out.println("Managed to catch arithmetic issue");
50            return 0;
51        }
52    }
53
54⊖    public static int addResult(int[] a, int b) {
55        if(b == 0)
56            throw new ArithmeticException();
57        int result = 0;
58        for(int i = 0; i < a.length; i++) {
59            result += (a[i] + b); //add b to each and add to sum
60        }
61        return result;
62    }
63
64⊖    public static int multiplyResult(int[] a, int b) {
65        if(b > 15)
66            throw new ArithmeticException();
67        if(b < 0 && a[0] < a[1])
68            throw new IllegalStateException();
69
70        int result = 0;
71        for(int i = 0; i < a.length; i++) {
72            result += (a[i] * b); //multiply b to each and add up total
73        }
74        return result;
75    }
```

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Please type the resulting output below:

Enter your answer here

Q5.3 Part C

1 Point

Given the following main method, give the output that results from running the code.

```
5⊖    public static void main(String [] args) {
6         try {
7             int[] a = {1, 2, 3};
8             int res = manageDataAndSend(a, -1, '*');
9             System.out.println("6th Result is " + res);
10
11            res = manageDataAndSend(a, 20, '+');
12            System.out.println("7th Result is " + res);
13        } catch (IllegalStateException e) {
14            System.out.println("Last defense");
15        }
16    }
```

For convenience, the functions needed are displayed again below:

Choose Files No file chosen

```
41        try {
42            if(op == '+')
43                return addResult(a, b);
44            else if(op == '*')
45                return multiplyResult(a, b);
46            else
47                throw new IllegalArgumentException();
48        } catch (ArithmeticException e) {
49            System.out.println("Managed to catch arithmetic issue");
50            return 0;
51        }
52    }
53
54⊖    public static int addResult(int[] a, int b) {
55        if(b == 0)
56            throw new ArithmeticException();
57        int result = 0;
58        for(int i = 0; i < a.length; i++) {
59            result += (a[i] + b); //add b to each and add to sum
60        }
61        return result;
62    }
63
64⊖    public static int multiplyResult(int[] a, int b) {
65        if(b > 15)
66            throw new ArithmeticException();
67        if(b < 0 && a[0] < a[1])
68            throw new IllegalStateException();
69
70        int result = 0;
71        for(int i = 0; i < a.length; i++) {
72            result += (a[i] * b); //multiply b to each and add up total
73        }
74        return result;
75    }
```

Please type the resulting output below:

Enter your answer here

Q6 Inheritance

3 Points

You will be given a few classes below that utilize inheritance. You will then be asked a series of questions regarding these classes and tracing the code polymorphically. (These classes will be repeated for each part for reference.)

```java
public abstract class SideA {

    public abstract void act1(int a, int b);
    public abstract void act2(int c);
    public void act3() {
        System.out.println("Take action!");
    }

    public void actionA() {
        System.out.println("Called in SideA");
    }

}
```

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```java
public class SideB extends SideA {

    public void act1(int a, int b) {
        System.out.println("SideB gets " + (a+b));
    }

    public void act2(int c) {
        System.out.println("Twice more");
        this.act3();
    }

    public void act3() {
        System.out.println("Third time is the charm");
    }

}
```

```java
public class SideC extends SideB {
    public void act1(int a, int b) {
        super.act1(a,  b);
        System.out.println("Only in C");
    }

    public void act3() {
        System.out.println("Making a statement");
    }

    public void actionA() {
        System.out.println("Function overwritten");
    }

    public void actionC1() {
        super.act1(1, 2);
        System.out.println("Local action");
    }

    public void actionC2() {
        System.out.println("Maybe here");
    }
}
```

```java
import java.util.ArrayList;

public class SideD {
    private SideA a;
    private ArrayList<SideB> b;

    public SideD(SideC input) {
        this.a = input;
        this.b = new ArrayList<SideB>();
    }
}
```

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Q6.1 UML

1 Point

Given the classes above, please give a UML Class Diagram that correctly represents the classes provided.

The classes are again:

```java
public abstract class SideA {

    public abstract void act1(int a, int b);
    public abstract void act2(int c);
    public void act3() {
        System.out.println("Take action!");
    }

    public void actionA() {
        System.out.println("Called in SideA");
    }

}
```

```java
public class SideB extends SideA {

    public void act1(int a, int b) {
        System.out.println("SideB gets " + (a+b));
    }

    public void act2(int c) {
        System.out.println("Twice more");
        this.act3();
    }

    public void act3() {
        System.out.println("Third time is the charm");
    }

}
```

```
public class SideC extends SideB {
    public void act1(int a, int b) {
        super.act1(a,  b);
        System.out.println("Only in C");
    }

    public void act3() {
        System.out.println("Making a statement");
    }

    public void actionA() {
        System.out.println("Function overwritten");
    }

Choose Files No file chosen
    public void actionC1() {
        super.act1(1, 2);
        System.out.println("Local action");
    }

    public void actionC2() {
        System.out.println("Maybe here");
    }
}
```

```
import java.util.ArrayList;

public class SideD {
    private SideA a;
    private ArrayList<SideB> b;

    public SideD(SideC input) {
        this.a = input;
        this.b = new ArrayList<SideB>();
    }
}
```

(If you wish, you may draw this using plantuml.com/plantuml or you may draw it by hand and submit a scan)

You do not need to worry about drawing the UML to represent the ArrayList, just the classes given.

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UML 6-1.pdf Download Remove

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Q6.2 Polymorphic Tracing Part 1 (Simple)

1 Point

Given the declarations below, you will be asked to trace the various pieces of code. For each portion of code, you are asked to type out the output precisely as it would be printed on the console (you may NOT run any of this code in Eclipse, you MUST trace this by hand).

The classes are again:

```java
public abstract class SideA {

    public abstract void act1(int a, int b);
    public abstract void act2(int c);
    public void act3() {
        System.out.println("Take action!");
    }

    public void actionA() {
        System.out.println("Called in SideA");
    }

}
```

```java
public class SideB extends SideA {

    public void act1(int a, int b) {
        System.out.println("SideB gets " + (a+b));
    }

    public void act2(int c) {
        System.out.println("Twice more");
        this.act3();
    }

    public void act3() {
        System.out.println("Third time is the charm");
    }

}
```

```java
public class SideC extends SideB {
    public void act1(int a, int b) {
        super.act1(a,  b);
        System.out.println("Only in C");
    }

    public void act3() {
        System.out.println("Making a statement");
    }

    public void actionA() {
        System.out.println("Function overwritten");
    }

    public void actionC1() {
        super.act1(1, 2);
        System.out.println("Local action");
    }

    public void actionC2() {
        System.out.println("Maybe here");
    }
}
```

```java
import java.util.ArrayList;

public class SideD {
    private SideA a;
    private ArrayList<SideB> b;

    public SideD(SideC input) {
        this.a = input;
        this.b = new ArrayList<SideB>();
    }
}
```

Choose Files No file chosen

The declarations for this problem are:

```java
SideA var1 = new SideB();
SideA var2 = new SideC();
SideB var3 = new SideB();
SideB var4 = new SideC();
SideC var5 = new SideC();
```

If the code results in a compiler error, type Compiler Error. If the code results in a runtime error, type Runtime Error. If the code results in no output at all, type No Output. Otherwise, type out the output exactly as it would appear on the console when the code is run.

For this part, there are 7 separate problems below. Please answer each in isolation, i.e., no lines should affect the others.

1)

```
var3.act3();
```

Third time is the charm

2)

```
var3.actionA();
```

Compiler Error

3)

```
var5.actionA();
```

Function Overwritten

4)

```
var1.act3();
```

Take Action!

Choose Files No file chosen

5)

```
var1.actionA();
```

Called in SideA

6)

```
var2.act1(3,  4);
```

SideB gets 7
Only in C

7)

```
var2.act3();
```

Making a statement

Q6.3 Polymorphic Tracing Part 2 (Complex)

1 Point

Given the declarations below, you will be asked to trace the various pieces of code. For each portion of code, you are asked to type out the output precisely as it would be printed on the console (you may NOT run any of this code in Eclipse, you MUST trace this by hand).

The classes are again:

```java
public abstract class SideA {

    public abstract void act1(int a, int b);
    public abstract void act2(int c);
    public void act3() {
        System.out.println("Take action!");
    }

    public void actionA() {
        System.out.println("Called in SideA");
    }

}
```

```java
public class SideB extends SideA {

    public void act1(int a, int b) {
        System.out.println("SideB gets " + (a+b));
    }

    public void act2(int c) {
        System.out.println("Twice more");
        this.act3();
    }

    public void act3() {
        System.out.println("Third time is the charm");
    }

}
```

```java
public class SideC extends SideB {
    public void act1(int a, int b) {
        super.act1(a,  b);
        System.out.println("Only in C");
    }

    public void act3() {
        System.out.println("Making a statement");
    }

    public void actionA() {
        System.out.println("Function overwritten");
    }

    public void actionC1() {
        super.act1(1, 2);
        System.out.println("Local action");
    }

    public void actionC2() {
        System.out.println("Maybe here");
    }
}
```

```java
import java.util.ArrayList;

public class SideD {
    private SideA a;
    private ArrayList<SideB> b;

    public SideD(SideC input) {
        this.a = input;
        this.b = new ArrayList<SideB>();
    }
}
```

Choose Files No file chosen

The declarations for this problem are:

```java
SideA var1 = new SideB();
SideA var2 = new SideC();
SideB var3 = new SideB();
SideB var4 = new SideC();
SideC var5 = new SideC();
```

If the code results in a compiler error, type Compiler Error. If the code results in a runtime error, type Runtime Error. If the code results in no output at all, type No Output. Otherwise, type out the output exactly as it would appear on the console when the code is run.

For this part, there are 8 separate problems below. Please answer each in isolation, i.e., no lines should affect the others.

1)

```
var2.act2(0);
```

Enter your answer here

2)

```
var2.actionC2();
```

Enter your answer here

3)

```
var4.act1(3,  4);
```

Enter your answer here

4) (*The following is either "compiler error" or "no output"*)

```
SideA varX = new SideA();
```

Enter your answer here

Choose Files No file chosen

5) (*The following is either "compiler error" or "no output"*)

```
SideC varZ = new SideB();
```

Enter your answer here

6)

```
((SideA)var1).act3();
```

Enter your answer here

7)

```
((SideB)var2).act3();
```

Enter your answer here

8)

```
((SideC)var2).actionC1();
```

Enter your answer here

Q7 Honesty Declaration

0 Points

Remember the allowed materials were 4 different sheets of paper:
1. The OO Design Principles handout
2. The UML cheatsheet
3. The Boxes & Pointers diagram cheatsheet
4. A single double-sided 8.5 x 11" paper cheatsheet that you made for yourself

What resources did you use during this exam?

If you realize now that you used something (or communicated with someone) you weren't supposed to, please describe what problem(s) you used it for and how long you used it. We understand that students may make mistakes at times, but we DO expect you to be honest if it happens.

Enter your answer here

Please type your full legal name below. Please note that by doing so, you attest that the following statement is entirely true:

"I certify that I did not communicate with anyone other than my instructor before or during the exam and that I will not communicate with anyone about the exam until permitted by my instructor. I understand that communicating with others about the exam before, during, or after taking the exam is sufficient to cause me to fail this exam and the course, including losing my ability to drop or grade replace."

Jacob Oblazny

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