

Family Name:..... Other Names: .....

ID Number: ..... Signature .....

# Model Solutions

## COMP 102: Test

18 August, 2016

### Instructions

- Time allowed: **50 minutes** .
- Answer **all** the questions. There are 45 marks in total.
- Write your answers in the boxes in this test paper and hand in all sheets.
- If you think some question is unclear, ask for clarification.
- Brief Java documentation is provided with the test
- This test contributes 15% of your final grade  
(But your mark will be boosted up to your exam mark if that is higher.)
- You may use paper translation dictionaries, and calculators without a full set of alpha-bet keys.
- You may write notes and working on this paper, but make sure your answers are clear.

### Questions

### Marks

1. Understanding programs

[16]

2. Writing programs with while

[9]

3. Writing two methods with if

[14]

4. Nested loops

[6]

TOTAL:

1. Understanding programs

(16 marks)

(a) (4 marks) Understanding variables and graphical output

Sketch what the following method will draw in the graphics pane. You may use the boxes to record the values of the variables.

```
public void testVariables (){
    double x1 = 100;
    double y1 = 200;
    double x2 = x1 + 100;
    double y2 = 300;
    UI.drawLine(x1, y1, x2, y2);
    x1 = x2;
    y1 = y2;
    x2 = x2 + 100;
    y2 = 150;
    UI.drawLine(x1, y1, x2, y2);
}
```

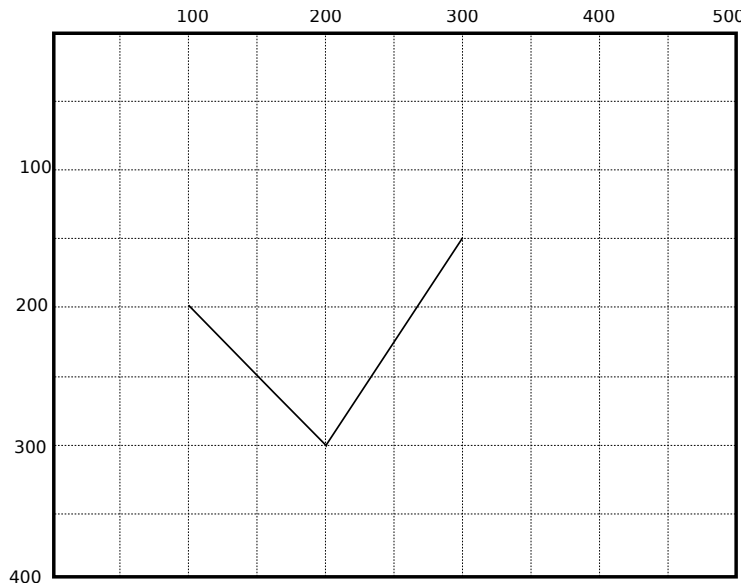
x1:

y1:

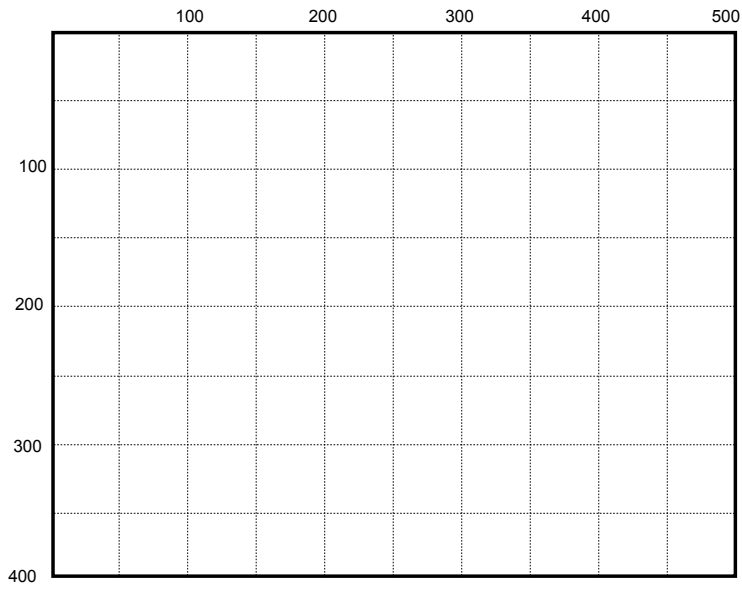
x2:

y2:

Graphics pane grid for your answer:



Spare copy of grid (for if you mess up on the first grid)



**(Question 1 continued)**

(b) (4 marks) Understanding if and return statements

The testNumber method below has one parameter and returns a boolean (true/false) value.

```
public boolean testNumber(int x){  
    if (x < 2 || x > 20)  
        return false;  
    else if (x > 5 && x < 10)  
        return true;  
    else  
        return x==3;  
}
```

What would the following calls to testNumber return?

this.testNumber(8) ==>

true

this.testNumber(15) ==>

false

this.testNumber(25) ==>

false

this.testNumber(3) ==>

true

(c) (4 marks) Understanding while statements

What will the following method print out?

```
public void printNumbers(){  
    int x = 5;  
    while(x >= 1){  
        Ul. println (x*2);  
        x = x-1;  
    }  
    Ul. println ("x is now " + x);  
}
```

```
10  
8  
6  
4  
2  
x is now 0
```

(d) (4 marks) Understanding method call statements

There are two methods and the first method calls the second method twice.

What will be printed out if the following method1 is executed?

```
public void method1(){
    int m = 2;
    int n = 4;
    UI.println (this.method2(4, 10));
    double d = 3 + this.method2(m, n+2);
    UI.println (d);
}
public double method2(int x, int y){
    UI.println ("y is " + y);
    return x + y/2;
}
```

```
y is 10
9.0
y is 6
8.0
```

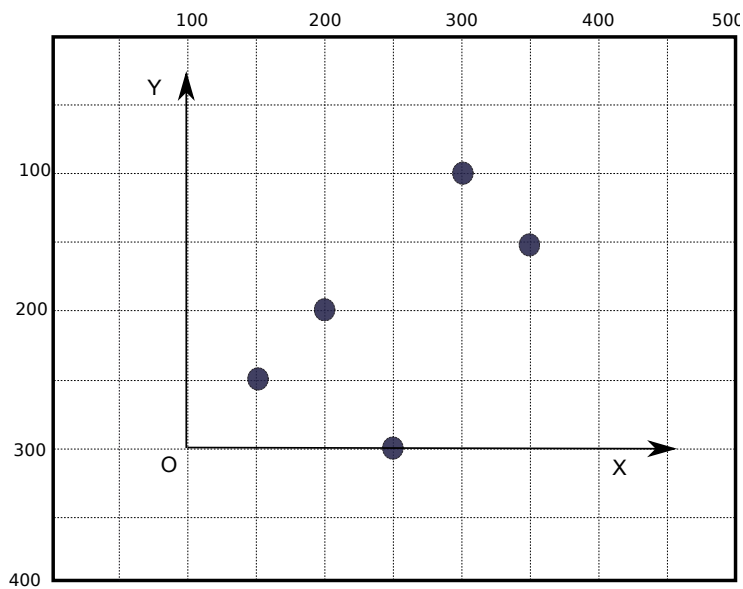
## 2. Writing programs with while

(9 marks)

Write a method to do the followings:

- Ask the user to enter a sequence of numbers, and exit when the user enters any text that is not a number.
- Plot the numbers as little dots in a graph. For the dots, the x coordinates increase by 50 for each dot and the y coordinates should show how big the numbers are. For example, if the user enters "50 100 0 200 150 end", the graph should look like the figure below.

You may assume that the x and y axis are drawn as shown in the figure and the origin is drawn at (100, 300). You do not need to draw them.





```
public void plotNumbers() {  
    UI.clearText ();           // clears the text pane  
  
    UI.println ("enter numbers, end with any text");  
    double x = 100;  
    double y = 300;  
    while (UI.hasNextDouble()){  
        double d = UI.nextDouble();  
        x= x + 50;  
        y = 300 - d;  
        UI.fillOval (x, y, 4, 4);  
    }  
}
```

## 3. Writing two methods using if

**(14 marks)**

This question is about a program that helps users to book tickets. You are required to write the program using two methods.

(a) **(6 marks)** Complete the ticketPrice method which returns a price for a particular type of ticket (e.g adult, child, family) specified in the parameter.

The base price is \$20.

- The ticket for an adult is the base price plus 15% GST.
- The ticket for a child is half of the base price plus 15% GST.
- The ticket for a family is two and half times of the base price plus 15% GST.

```
public double ticketPrice (String ticketType){
    double p = 20;
    if (ticketType.equals("child")){
        p = p * 1/2 * 1.15;
    }
    else if (ticketType.equals("family")){
        p = 2.5 * p * 1.15;
    }
    else{
        p = p * 1.15;
    }
    return p;
}
```

}

**(Question 3 continued)**

(b) (8 marks) Complete the ticketBooking method. This method should ask the user for the number of adults and the number of children, and then choose the right types of tickets and print the total price. This method should call the ticketPrice method to get the price for different types of tickets.

A family ticket covers up to two adults and three children, and it only applies when buying a family ticket is cheaper than buying each ticket separately. For example, if the user only wants to buy tickets for 2 adults, the family price does not apply, and the price is just 2 \* the adult ticket price.

Large families with more than 2 adults and 3 children have to buy extra tickets for people who are not covered by the family ticket. For example, if a family has 3 adults and 5 children, the method should book 1 family ticket, 1 adult ticket and 2 child tickets.

This method only allows one family ticket to be purchased per booking.

This method should print out the total price at the end.

```

public void ticketBooking(){

    int numa = Ul.askInt("How many adults: ");
    int numc = Ul.askInt("How many children: ");
    double price = numa * this.ticketPrice("adult");
    price = price + numc * this.ticketPrice("child");

    int da = 0;
    int dc = 0;

    if (price > this.ticketPrice("family")) {
        if (numa > 2){
            da = numa-2;
        }
        if (numc > 3){
            dc = numc-3;
        }
        double newprice = this.ticketPrice("family") + da* this.ticketPrice("adult")
            + dc * this.ticketPrice("child");
        if (newprice < price){
            price = newprice;
        }
    }

    Ul.println(" the price is " + price);
}
}

```

## 4. Nested Loops

(6 marks)

The following drawStuff method draws lines and circles on the graphics pane.

Sketch what it will draw on the grid on the facing page.

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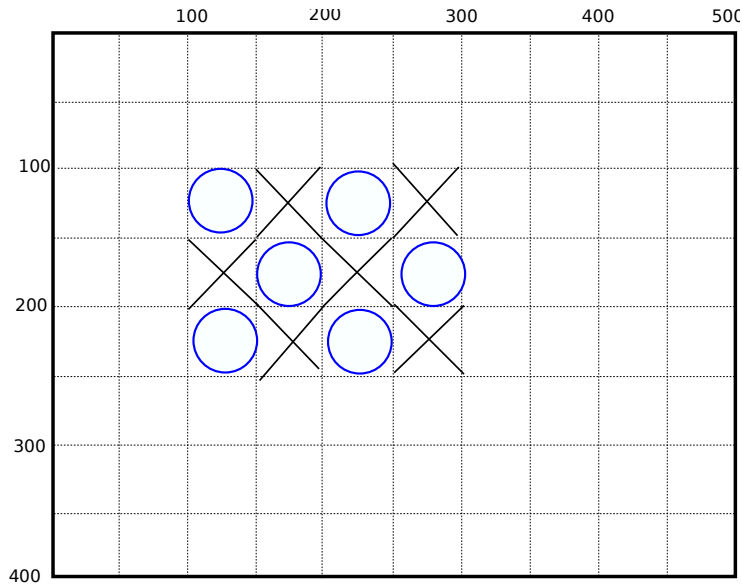
```
public void drawStuff(){
    int y = 100;
    boolean flag = false;

    while(y < 250){
        x = 100;
        while (x < 300){
            if (flag){
                UI.drawLine(x, y, x+50, y+50);
                UI.drawLine(x+50, y, x, y+50);
            } else {
                UI.drawOval(x, y, 50, 50);
            }
            x = x + 50;
            flag = !flag;
        }
        y = y + 50;
        flag = !flag;
    }
}
```

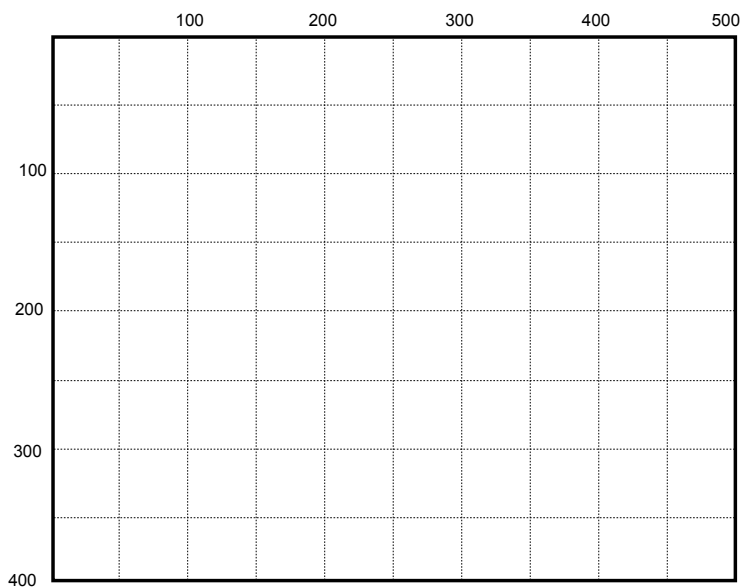
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**(Question 4 continued)**

Graphics pane grid for your answer:



Spare copy of grid (for if you mess up on the first grid)



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