

Information and Computer Science Department

King Fahd University of Petroleum and Minerals

College of Computer Sciences and Engineering

Information and Computer Science Department

First Semester (081)

ICS 201 - Introduction to Computing II

Final Exam

Thursday, 5th February, 2009

Time: 120 minutes

Name:

ID#:

Please circle your section number below:

Section	03	04	05	06
Instructor	Helmy	Ghouti	Sukairi	Yahyaoui
Day and Time	SMW 9 - 9:50	SMW 10 - 10:50	SMW 8 - 8:50	SMW 1 - 2

Question #	Maximum Mark	Obtained Mark
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

Question 1**[20 Points]****Part I: True/False Questions****[10 Points]**

1	Applets that are accessed on the net can access files on user's PC.	
2	The class loader of the java virtual machine allocates memory for the class (i.e., static) variables and sets them to Java-default initial values during the linking phase.	
3	Processing raster graphics images is more efficient than vector graphics images.	
4	Method overriding is not allowed if the access scope is widened.	
5	Protected is the access modifier for a class member variable which is to be used in the same package where the class is defined.	
6	Polymorphism allows changes to be made to method definitions in the derived classes, and have those changes apply to the software written for the base class.	
7	Multiple inheritance is allowed for both classes and interfaces.	
8	An inner class has access to private methods and instance variables of its outer class.	
9	A recursive method with no base case will run indefinitely.	
10	If a class B extends class A, then class B can directly access all methods of class A.	

Part II: Multiple Choice Questions**[10 Points]**

1. When the point specified by the following vector notation: $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$ in the original vector graphics image is moved to the point with coordinates $\begin{bmatrix} 4 \\ 16 \end{bmatrix}$, the following transformation has occurred:

- a. Translation by 2 in the X-axis and 4 in the Y-axis.
- b. Uniform scaling by $\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$
- c. Non-uniform scaling by $\begin{bmatrix} 0.5 & 0 \\ 0 & 0.25 \end{bmatrix}$
- d. Non-Uniform scaling by $\begin{bmatrix} 2 & 0 \\ 0 & 4 \end{bmatrix}$

2. How can you prevent a class from being extended?

- a. Declare a class static.
- b. Declare a class private.
- c. Declare a class protected.
- d. Declare a class final.

3. What is wrong with the following recursive code?

```
int recursive(int n) {  
    if(n == 0)  
        return 1;  
    else  
        return n + n-1;  
}
```

- a. There is no base case
- b. There is no recursive step
- c. Variable n should be declared as double
- d. The method does not return any value

4. All of the following are methods of the Iterator interface except:

- a. clear()
- b. hasNext()
- c. next()
- d. remove()

5. If class B extends class A, which of the following is false:
- All fields and methods with protected accessibility are inherited.
 - All fields and methods with default accessibility are inherited.
 - Calling a constructor of class B will always call a constructor of class A.
 - Objects of type B are also of type A.
6. Which of the following is true:
- A final class can not be instantiated.
 - A final method can be overloaded but not overridden.
 - Private methods are inherited by subclasses.
 - The *instanceof* operator checks whether a given object is an instance of some class.
7. For polymorphism to work, certain things must be provided. Which of the following is NOT one of them?
- The reference type must be a super type of the object it references.
 - The reference type must be an interface or an abstract class.
 - The method called must be declared in the reference type and defined in the object type.
 - Late or dynamic binding must be allowed.
8. Which of the following is NOT true about polymorphism?
- By polymorphism, we get more general and flexible code.
 - In polymorphism, upcasting occurs automatically.
 - The return type of a polymorphic method must be void.
 - Polymorphism does not work for static methods.
9. Which of the following statements is true?
- An interface can only contain methods
 - Interfaces can have some methods with empty implementations
 - A class may extend only one other class and implement only one interface
 - Interfaces are the Java approach to achieve multiple inheritance
10. What is true about inner classes?
- Inner classes have to be instantiated only in the enclosing class
 - Inner classes can access all the final variables of the enclosing class
 - Inner classes cannot be static
 - Inner classes cannot be anonymous class

1	2	3	4	5	6	7	8	9	10

Question 2**[20 Points]**

Design and implement a Java program that uses an **ArrayList** of parameter type **Book** to store a database of books. The **Book** class should store the book's **Title**, **Author**, **ISBN** and **Price**. The saved books are sorted in the database by **ISBN**.

Provide the **Book** class with all the necessary methods and write a **Test class** that shows:

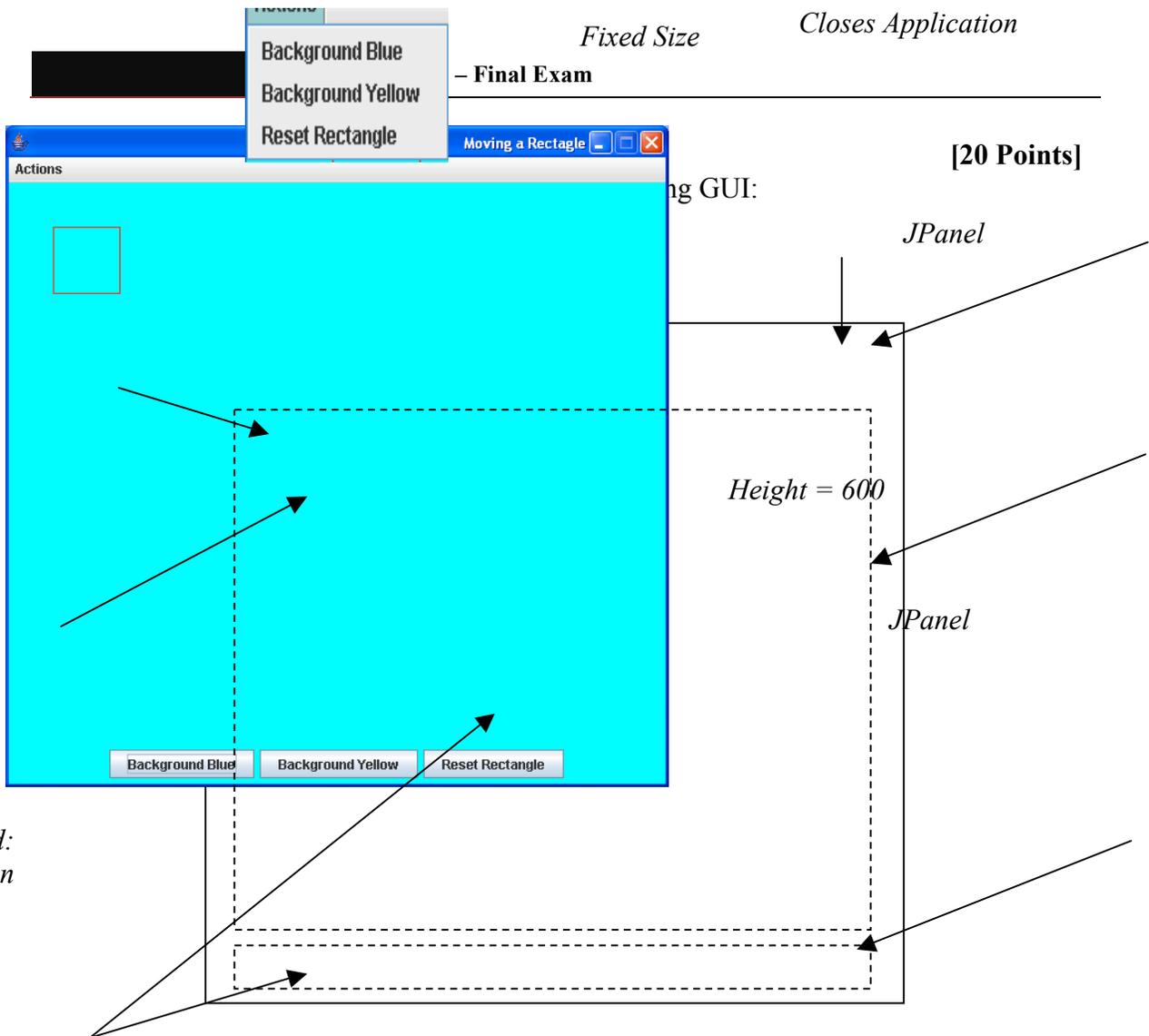
- How to add 5 books,
- Do a search for a specific book and
- Sort all the books in the database

Using the methods defined in the **Collections** (or **Arrays**) class (**no need to implement the search and sort methods, you can invoke them direct**).

$i = 60$
 $t = 60$
 $= Red$

$(10, 40)$

Background:
Cyan



The following actions should be handled:

- 1- Whenever the user clicks the mouse, the rectangle object gets repainted with the upper-left corner specific by the click coordinates (x and y).
- 2- Whenever the user clicks the button labeled "Background Blue", the whole background becomes blue.
- 3- Whenever the user clicks the button labeled "Background Yellow", the whole background becomes blue.
- 4- Whenever the user clicks the button labeled "Reset Rectangle", the rectangle gets repainted at the upper-left corner coordinates given by: (40, 40).
- 5- The same actions should be handled by the menu items shown below:

Question 4 (220, 150)

Font: "Arial", Bold, Size: 70

[20 Points]

Write a program in Java which draws the following graphic. The specifications are given below.

Board: Red Color, STOP: White Color

Rectangle: Gray Color width = 20, height = 100

GUI

Specifications



The inside of the stop sign is a regular 8-sided polygon with approximately equal side lengths. Locations of three points are given for ease of calculation.

Question 5**[20 Points]****Part I: Code Modification****[15 Points]**

Consider the following Java application code. Provide the changes to make your code work as an applet. You can omit and replace the existing code without rewriting.

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

public class Test_Final_Exam_081 {
    public static void main(String[] args) {
        new MyFrame();
    }
}

class MyFrame extends JFrame implements MouseListener {
    public MyFrame() {
        setTitle("Playing With The Mouse!");
        setSize(400, 400);
        setResizable(false);
        setVisible(true);
        addMouseListener(this);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        show();
    }
    public void mouseEntered(MouseEvent me) {
        System.out.println("Mouse entered at: (" + me.getX() + ", " + me.getY() +)");
    }
    public void mouseExited(MouseEvent me) {
        System.out.println("Mouse exited at: (" + me.getX() + ", " + me.getY() +)");
    }
    public void mouseClicked(MouseEvent me) {
        System.out.println("Mouse clicked at: (" + me.getX() + ", " + me.getY() +)");
    }
    public void mousePressed(MouseEvent me) {
        System.out.println("Mouse pressed at: (" + me.getX() + ", " + me.getY() +)");
    }
    public void mouseReleased(MouseEvent me) {
        System.out.println("Mouse released at: (" + me.getX() + ", " + me.getY() +)");
    }
} // End of MyFrame class
```


Part II: Applet Output**[5 Points]**

What is the output of the following HTML file when run in an Internet browser (such as IEExplorer)?

```
<applet code = PaintingDemo.class width = "400" height = "400">
</applet>
```

The HTML file above makes reference to the following Java applet:

```
import javax.swing.*;
import java.awt.*;

public class PaintingDemo extends JApplet {
    public static final int FRAME_WIDTH = 400;
    public static final int FRAME_HEIGHT = 400;

    private class APanel extends JPanel {
        public void paint(Graphics g) {
            super.paint(g);
            setBackground(Color.YELLOW);
            g.drawOval(FRAME_WIDTH/4, FRAME_HEIGHT/8, FRAME_WIDTH/2,
FRAME_HEIGHT/6);
        }
    }

    public void init() {
        getContentPane().setLayout(new GridLayout(2, 1));
        APanel p = new APanel();
        getContentPane().add(p);
        JPanel APanel2 = new JPanel();
        APanel2.setBackground(Color.WHITE);
        getContentPane().add(APanel2);
    }
}
```

