

University of Cape Town  
Department of Computer Science

Computer Science CSC116S

**Test 2 - 14 September 2005**

- Answer all questions.
- All questions that refer to elements of programming make reference to the Java programming language as studied in class.
- Good luck !

**Marks:** 30

- Approximate marks per question are shown in brackets

**Time:** 40 minutes

- The use of calculators is permitted

**NAME:**

Surname	Initials

**STUDENT NO:**  **COURSE CODE:**

This paper consists of 3 questions and 7 pages (including this cover page).

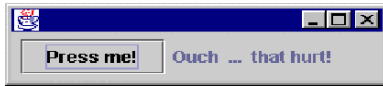
Mark Allocation							
Quest	Marks	Internal	External	Quest	Marks	Internal	External
1	[12]			3	[8]		
2	[10]						
<b>Total</b>				<b>Total</b>			
<b>Grand Total</b>							
<b>Final Mark</b>							
<b>Internal Examiner:</b>				<b>External Examiner:</b>			

## Section 1. Graphical User Interfaces

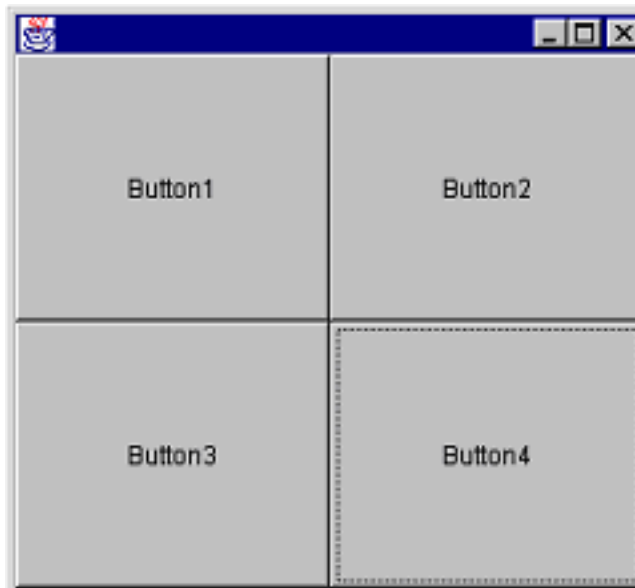
### Question 1. [12 marks]

a) Draw the component hierarchy diagram for the figure below.

[1]



b) Using GridLayout Manager please write the Java code to implement the GUI below.



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[4]

- c) Look at the code below. Extend the program so that the line “ok, now I’m really pressed.” appears on the screen each time the button is pressed.

```
public class ButtonTest extends Frame {
    public static void main(String args[]) {
        ButtonTest bt = new ButtonTest();
    }

    public ButtonTest() {
        JButton b = new JButton(Test);
        add(b);
        pack();
        setVisible(true);
    }

    public void ButtonPressed(Button b) {
        System.out.println(pressed !);
    }
}
```

Hint: listener, event handling.



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### Section 2. Stacks, Queues and Trees

**Question 2. [10 marks]**

a) Calculate the value of the following Reverse Polish Notation expression using a Stack. Remember to show all your working

$45+9*3+3/$

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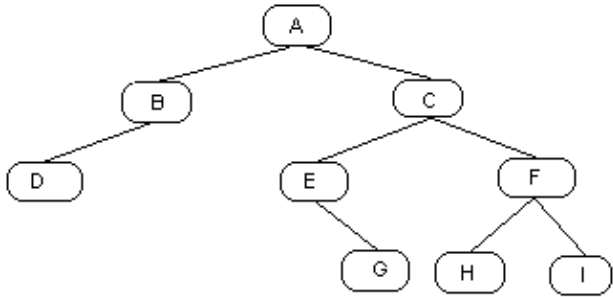
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[2]

b) Please traverse the tree in the figure below using Preorder, Postorder and Inorder traversals.



Preorder

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[2]

Postorder

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[2]

Inorder

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[2]

- c) Given an empty binary search tree of integers, show the structure of the tree after each of the values 5, 2, 4, 7, 8, 1, 3 is inserted. Show the steps not just the final solution. [2]

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### Section 3. Graphics in Java

**Question 3. [8 marks]**

For the following questions, assume the Java2D graphics primitives:

Arc2D.Float (x, y, width, height, start, extent, type)

Ellipse2D.Float (x, y, width, height)

Line2D.Float (x1, y1, x2, y2)

Rectangle2D.Float (x, y, width, height)

RoundRectangle2D.Float (x, y, width, height, arcwidth, archeight)

- a) Draw the figure that results from the following sequence of drawing statements in Java2D.

```
canvas.draw (new RoundRectangle2D.Float (100, 100, 200, 200, 5, 5));  
canvas.draw (new Line2D.Float (100, 130, 300, 130));  
canvas.draw (new Rectangle2D.Float (275, 105, 20, 20));  
canvas.draw (new Line2D.Float (278, 108, 292, 122));  
canvas.draw (new Line2D.Float (278, 122, 292, 108));  
canvas.draw (new Ellipse2D.Float (105, 105, 20, 20));
```

[6]

- b) Why must we use the paintComponent method to draw graphics instead of drawing them from the containing Frame's constructor?

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[2]