

Please fill in your Student Number

Student Number : _____

Name:

Student Number:

University of Cape Town ~ Department of Computer Science

Computer Science 1011H/1016S ~ 2009

Test 3

Question	Max	Mark	Internal	External
1	12			
2	12			
3	6			
TOTAL	30			

Marks : 30

Time : 40 minutes

Instructions:

- a) Answer all questions.
- b) Write your answers in the space provided.
- c) Show all calculations where applicable.

Question 1: Stacks [12 marks]

Use the following code to answer the questions that follow.

```
public class Stack
{
    private class Node
    {
        private String item;
        private Node link;

        public Node ()
        {
            item = null;
            link = null;
        }

        public Node ( String newItem, Node linkValue )
        {
            item = newItem;
            link = linkValue;
        }
    } //End of Node inner class

    private Node head;

    public Stack ()
    {
        head = null;
    }

    public void push ( String itemName )
    {
        // Correct the errors
        head = new Node (itemName);
        head = head.link;
    }

    public String pop ()
    {
        if (head == null)
            System.out.println ("Nothing to pop");
        else
        {
            // Fill in
        }
    }

    public boolean isEmpty ()
    {
        return (head == null);
    }
}
```

a) Fill in the else part of the **pop** method.

[3]

b) The **push** method has two errors. Correct them.

[2]

c) Explain how evaluation of a **postfix expression** can make use of a stack.

[5]

- d) How would you change the above program so that it can operate as a queue? (You do not need to write code; just explain in words) [2]

Question 2: Graphical User Interfaces [12 marks]

Use the following program to answer the questions that follow.

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

public class TestGui extends JFrame implements ActionListener
{
    public static final int WIDTH = 300;
    public static final int HEIGHT = 200;

    private JTextField textField;
    private JButton button;
    private JLabel label;
    private JPanel topPanel, midPanel, bottomPanel;

    public static void main ( String[] args )
    {
        TestGui gui = new TestGui();
        gui.setVisible (true);
    }

    public TestGui ()
    {
        super("Panel Demonstration");
        setSize (WIDTH, HEIGHT);
        setLayout (new GridLayout(3,1));
        topPanel = new JPanel();
        midPanel = new JPanel();
        bottomPanel = new JPanel();
        add (topPanel);
        add (midPanel);
        add (bottomPanel);

        textField = new JTextField ("Type something here", 20);
        topPanel.add (textField);
        button = new JButton ("Click");
        button.addActionListener (this);
        midPanel.add (button);
        label = new JLabel();
        bottomPanel.add (label);
    }

    public void actionPerformed ( ActionEvent e )
    {
        int n = textField.getText().length();
        label.setText (textField.getText() + " = " + n);
    }
}
```

a) Draw the window that appears when this program is run.

[5]

b) Describe the problem that occurs when you click on the X at the top right hand corner of the window. Write the code that would correct this problem. [3]

c) What happens when you click on the button in the window (i) before doing anything else and (ii) after deleting anything in the text field and typing Hello World in it? [4]

Question 3: Ethics [6 marks]

- a) The book “Little Brother” by Cory Doctorow was licensed by a Creative Commons License. What was the advantage of the license for our class, compared to the licenses that we obtain for most other books in the shops? [2]

- b) What is meant by a “policy vacuum” or a “policy gap” in the context of Computer Ethics and Law? [2]

- c) What are the problems that arise in trying to decide if Computer Programs should be *Property* if we adopt a traditionalist approach to norms and principles? [2]
