

PRIFYSGOL CYMRU; UNIVERSITY OF WALES

DEGREE EXAMINATIONS JANUARY 2003

SWANSEA

Computer Science

CS 214 Object Technology
external candidate

Attempt 2 questions out of 3

Time allowed: 2 hours

Students are permitted to use the dictionaries provided by the University

Students are NOT permitted to use calculators

CS_214
OBJECT TECHNOLOGY

(Attempt 2 questions out of 3)

Question 1

(a) Evaluate the way in which Java deals with exceptional circumstances. Include a brief discussion of the way traditional programming languages deal with this problem.

[10 marks]

(b) The following section of code is part of an applet to carry out mortgage repayment calculations.

```
1.    import java.applet.*;
2.    import java.awt.*;
3.    import java.awt.event.*;
4.    public class Mortgage extends Applet
5.    {
6.        Button calculate = new Button();
7.        TextField amount = new TextField();
8.        Label lAmount = new Label();
9.        TextField years = new TextField();
10.       Label lYears = new Label();
11.       Label lRepayment = new Label();
12.       TextField repayment = new TextField();
13.       public void init()
14.       {
15.           super.init();
16.           calculate.setLabel("calculate");
17.           calculate.addActionListener(new ActionListener()
18.           {
19.               public void actionPerformed(ActionEvent e)
20.               {
21.                   calculate_actionPerformed(e);
22.               }
23.           });
24.           amount.setText("amount");
25.           lAmount.setText("amount to be borrowed £");
26.           years.setText("years");
27.           lYears.setText("time period");
28.           repayment.setText("repayment");
29.           lRepayment.setText("monthly repayment");
30.           this.add(lAmount);
```

```

31.         this.add(amount);
32.         this.add(1Years);
33.         this.add(years);
34.         this.add(1Repayment);
35.         this.add(repayment);
36.         this.add(calculate);
37.     }
38. }

```

(i) Write the code you would expect to find in the `calculate_actionPerformed` method associated with the `calculateButton`, omitting any code required for data validation and error checking. Assume that the value for annual percentage rate (`apr`) is hard coded into this method, and that the total amount to be repayed can be calculated using the formula

$$\text{total amount repayed} = \text{amount borrowed} * (1 + \text{apr} * \text{period of loan})$$

[8 marks]

(ii) Outline the code required to ensure that the input fields contain valid data before the calculations are carried out, and state all assumptions made, e.g. maximum repayment period.

[7 marks]

Question 2

(a) Analyse the additional features found in an object-oriented programming language when compared with more traditional languages. Consider how these features should lead to the development of improved quality software. Include a definition of the object-oriented approach, and discuss the underlying concepts of this approach. Your answer should include examples of object-oriented code to illustrate these differences.

[18 marks]

(b) Briefly discuss the Java solution used to overcome the limitations of single inheritance which could result in the need to duplicate methods across classes.

[7 marks]

Question 3

(a) Briefly evaluate the role of UML in the development of a standard for object-oriented analysis and design. Consider the need for modelling of systems in your answer, and include brief descriptions of some of the major diagrams used in UML.

[9 marks]

(b) A system is required to record and monitor the progress of transactions for an on-line bookstore. The process of making an on-line purchase begins when a customer submits a request to the bookstore containing the following information

- selected book
- name
- address
- credit/debit card details

This information is handled by a number of other computer systems and company staff. The stock database is checked to ensure the availability of the selected book. A customer database is updated either by adding the details of a new customer, or modifying the records of an existing customer. A credit checking agency is employed to check the credit/debit card details. Company staff can monitor the transaction and update its status.

(i) Produce a use case diagram to illustrate the relationship between the system and its environment.

[8 marks]

(ii) Produce an activity diagram illustrating the process of purchasing a book.

[8 marks]