

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING
Department of Computer Engineering

Final Examination: Semester 1

Academic Year: 2009-2010

Date: 30th September 2009

Time: 9:00 – 12:00 (3 hours)

Subject Number: 240-321

Room: A400

Subject Title: Advanced Computer Programming Techniques

Lecturer: Aj. Andrew Davison

Exam Duration: 3 hours

This paper has 3 pages.

Authorised Materials:

- Writing instruments (e.g. pens, pencils).
- Books (e.g. dictionaries) and calculators are **not** permitted.

Instructions to Students:

- *Answer questions in English.* Perfect English is **not** required.
- Attempt all questions.
- Write your answers in an answer book.
- Start your answer to each question on a new page
- Clearly number your answers.
- Any unreadable parts will be considered wrong.
- When writing programs, use good layout, and short comments; marks will not be deducted for minor syntax errors.
- The marks for each part of a question are given in brackets (...).

Question 1

(30 marks; 30 minutes)

- What does a subclass inherit from its superclass? (5)
- What are the uses of the `super` reserved word? (5)
- What is a *polymorphic* data structure? (20)

Each answer should include diagrams and **small** code fragments where possible.

Question 2

(30 marks; 30 minutes)

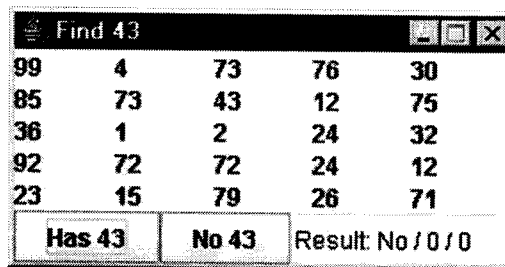
What are the *three* main uses of the `interface` type?

Your answer should include diagrams and **small** code fragments where possible.

Question 3

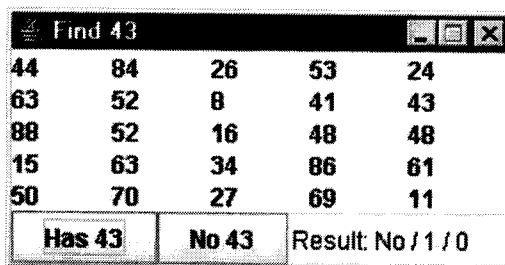
(90 marks; 90 minutes)

Implement the Find43 application. Its GUI interface has the form:



A grid of 25 random integers between 0 and 99 are shown in the top half of the window. The player must press one of two buttons depending on whether "43" is in the grid. In this example, the user pressed the "No 43" button, which is incorrect since there is a "43" in the numbers grid.

The textfield on the right is then updated with the game number and the score, and a new grid of random integers is displayed:



If the user had pressed the correct button ("Has 43"), then the text field would show "Result: Yes / 1 / 5". The first number is the number of games played, the second is the total score. The score depends on the amount of time that has passed since the grid was generated and when the user pressed on a button.

The user can keep playing until he presses the window's close box.

Some statistics are printed to standard output as the game exits:

```
No. of Games: 2
Total Score: 0
Average Score: 0
```

Hints

The GUI should use a BorderLayout, GridLayout, and JPanels for organizing the components. You may need other layout managers as well.

The grid of random numbers should be represented by an array of JLabels.

Random integers in the range 0 to 99 can be generated using a Random object and its nextInt() method:

```
Random rand = new Random();
int num0 = rand.nextInt(100); // random integer
int num1 = rand.nextInt(100); // another random integer
```

An ActionListener should be attached to both buttons.

Use System.currentTimeMillis() to get the current time in milliseconds.

The close box should be monitored by a WindowListener, which prints statistics before making the application exit.

Question 4

(30 marks; 30 minutes)

- List five common examples of exceptions.
- If no exceptions are thrown in a try block, where does control go to when the try block completes?
- What happens if an exception occurs and no suitable exception handler can be found?
- What happens if several handlers match the type of the thrown exception?
- Why would a programmer give a superclass type as the type of a catch handler, and then throw an exception of a subclass type?
- Give one reason for using catch(Exception e).
- What is the main reason for using a finally block?
- What happens when a catch handler throws an exception?

--- End of Examination ---