

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING
Department of Computer Engineering

Final Examination: Semester 2

Academic Year: 2012-2013

Date: 6th March 2014

Time: 13:30 – 16:30 (3 hours)

Subject Number: 241-211

Room: Robot Head

Subject Title: Object Oriented Programming (using Java)

Lecturer: Aj. Andrew Davison

Exam Duration: 3 hours

This paper has 2 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

(60 marks; 60 minutes)

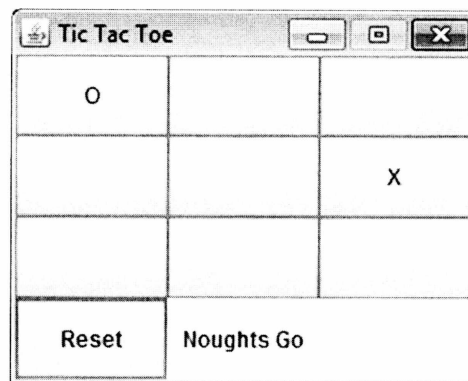
- What is a subclass and superclass? (10)
- What is a protected method? (5)
- What is a *polymorphic* data structure? (15)
- What are the main differences between an interface and an abstract class? (10)
- What are the *three* main uses of the `interface` type? (20)

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

Question 2

(120 marks; 120 minutes)

- Create a Tic-Tac-Toe game like the one shown below. Use nine buttons to represent the game positions, and a "Reset" button to restart the game. Game information (e.g. "Noughts Go") is printed in a text field. (80)



When the "Noughts" user takes a turn, a "O" becomes the text of the pressed button. When "Crosses" takes a turn, an "X" is added to the chosen button. If three X's or O's are detected in a row, column, or diagonal, then that person wins. You should report the win in the game's text field.

Coding hints: `JButton.setText()` and `JButton.getText()` will be useful. A blank button can be labelled with a 1-space string, " ". My solution uses an array to store the nine buttons making up the game positions. I check for a winner by calling a `checkWinner()` method, which makes multiple calls to an `isWinLine()` to check the different ways of winning.

- Apart from the code for Tic-Tac-Toe, make sure to properly document the code with comments (as specified in Part 16 of the notes). (20)
- Draw three diagrams to illustrate your code: (20)
 - a class diagram;
 - a component layout hierarchy of your GUI;
 - an event model diagram.

--- End of Examination ---