Beijing-Dublin International College

SEMESTER 1 FINAL EXAMINATION - (2017/2018)

School of Computer Science

COMP2005J Object Oriented Programming

Prof. Pádraig Cunningham
Dr. Seán Russell*

Time Allowed: 60 minutes

Instructions for Candidates:

All questions carry equal marks.
Answer any two questions.

BJUT Student ID:——————————— **UCD Student ID:**———————————

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge:———————————————————————— **(Signature)**

Instructions for Invigilators

Non-programmable calculators are permitted.
No rough-work paper is to be provided for candidates.

Question 1: Basic Java, Inheritance and Interfaces

a. What is the function of the keyword `final` in Java? What effect does it have on a variable? What effect does it have on a method? What effect does it have on a class?

(10%)

b. What is the difference between method overloading and method overriding in Java? Explain both. Why are these useful features?

(10%)

c. Variables, classes, Interfaces and methods can have different access levels (visibilities). For the levels `private`, `protected` and `default`, describe where variables declared with each one can be accessed from. Give an example of a variable declared with each access level.

(10%)

d. Explain the idea of **polymorphism** in your own words. You should illustrate an example with some code showing its use.

(10%)

e. What are the differences between an abstract class and an interface in Java? Explain a situation where an interface is more useful than an abstract class.

(10%)

(Total 50%)

Question 2: Generics, Exceptions and Streams

a. Explain how generics improves type checking in the compiler. Give an example of a situation where an error would not be detected without generics.

(10%)

b. When does Java know what type a generic object will be using? Give an example of the code required to use a generic class named GC. The class has a constructor that takes no parameters.

(10%)

c. Explain why we must use a `try-catch` statement when an `IOException` is possible, but not when a `NullPointerException` is possible. What is the reason for this difference? How can we know the difference between these two types of exceptions.

(10%)

d. What is the difference between the information in a text file and a data file? Give an example of both storing the int 123. What would happen if I try to use `readLine` from a `BufferedReader` to read information from a data file containing integer values?

(10%)

e. In what situation is it appropriate to use an enumerated type? What naming rules are used for the individual values of an enumerated type named and why? Give an example of the definition of a simple enumerated type.

(10%)

(Total 50%)

Question 3: Input, Testing and Threads

a. Explain how callback methods can be used for user interaction. Explain how we could have a message printed to the screen when the user clicks the mouse.

(10%)

b. Describe the difference between traditional testing and unit testing. How do we know when we have enough code coverage in our testing?

(10%)

c. Explain the effect of the synchronized keyword on a method in Java. What happens if two threads try to use synchronised methods in the same object at the same time? Why is this useful?

(10%)

d. Describe the two ways a thread can be created in Java.

(10%)

e. Assume that you need to read some information from the command line. The information is two numbers followed by a single string (with no spaces). Write the code to create a scanner and use it to read this information. If the information is entered correctly, the numbers should be added together and printed to the screen followed by the string. If any information is not in the correct format then the message `"Error reading data"` should be printed to the screen.

(10%)

(Total 50%)