

## FINAL EXAMINATION

Course: **CS202 – PROGRAMMING SYSTEMS**

Time: **90 minutes**

Term: **1 – Academic year: 2018-2019**

Lecturer(s): **Dr. Dinh Ba Tien**

Student name:

Student ID:

*(Notes: Closed Book Exam)*

**Problem 1.** In object-oriented programming:

- 0.5 a. What is the main difference between a **struct** and a **class**?
- 0.75 b. What are **constructors** in C++? Give examples for each.
- 0.75 c. In which case the **auto-generated copy assignment operator** does not work well? Why?
- 0.75 d. What is **inheritance**? Give an example to illustrate.
- 0.75 e. What is a **pure virtual function**? What happens to the class which has a pure virtual function?

**Problem 2.** What is the **diamond problem** in multiple inheritance? How to handle the diamond problem?

1.5

**Problem 3.** What are the names of the 2 **design patterns** given to your group? Draw the **class diagram** and **describe** one of them that you know better.

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**Problem 4.** You are asked to implement an application for a cake shop. The shop makes cakes based on customers' orders. It is able to make 3 different kinds of cakes, including Square-shape, Rectangle-shape and Circle-shape. The customer needs to let the shop know **how many** cakes he/she wants, **which type** of cake for each (Square-shape, Rectangle-shape and Circle-shape). For each type, the customer has to tell the **sizes** accordingly, i.e. Square cake: the length in centimeters, the Rectangle: the width and the height, and the Circle: the radius. The price of a cake depends on the type of the cake, and is calculated as follow:

- Square: \$2 per square centimeters
- Rectangle: \$3 per square centimeters
- Circle: \$4 per square centimeters

- 1 a. You are asked to draw the **class diagram** of the problem.
- 1.5 b. Write the source code for the shop assistant to input the customer's order with all the information needed.
- 1.5 c. Write the code for the system to print out the price of each cake and the total price that the customer has to pay for his/her order.

**-- GOOD LUCK --**