# Part 1. Non-programming Questions ( 50 points)

## Q1. (18 points) Choose one correct answer for each subquestion below.

**1. Which of the following statements is correct about abstract class in Java?**

a. We cannot create an instance of an abstract class, but we can extend it (to define a

subclass)

b. We can create an instance of an abstract class, but we cannot extend it (to define a

subclass)

c. We can only define abstract methods in an abstract class, and we can extend it.

d. We can only define abstract methods in an abstract class, and we cannot extend it.

**2. Which of the following statements is correct about method overloading in**

**Java?**

a. We could not define two methods with the same name in a Java class

b. Two methods are considered overloading methods if they have different parameter

names

c. Two methods are considered overloading methods if they have the same name but a

different number of parameters and data types

d. Two methods have different implementation

**3. Which of the following statements are correct?**

**i) We could not define constructor methods in an abstract class**

**ii) We have to define a class containing abstract methods with the abstract**

**keyword in the class header**

**iii) We could not define class member variables inside an abstract class**

a. i) and ii) are both correct b. Only ii) is correct

c. Only i) is correct d. All of them are correct

**4. The \_\_\_\_\_\_\_\_\_ keyword is used to refer to the superclass instance.**

a. this b. super

c. self d. final

**5. In Java, \_\_\_\_\_\_\_\_\_\_ is the ability to define an operation (method) that can be**

**performed in different ways depending on the invoked objects.**

a. abstract b. static

c. polymorphism d. final

**6. In Java, a class can have a maximum of \_\_\_\_\_\_\_\_ superclass (parent class).**

a. 0 b. 1

c. 2 d. infinite

**Q2. (16 points) Drawing class hierarchy**

Suppose you are asking to develop a program to manage the information of different

people in a university, such as students, faculty, and staff. Faculty and staffs are

employees of the university, but students are not. There are different types of students

in the university: undergraduate or graduate students. The graduate students can be

classified into Master or Doctoral students.

**Task**: Draw the class hierarchy for this application.

**Note**: You are required to draw the class hierarchy, not the UML diagram. So, you do

not need to specify the attributes and methods for each class.

Doctoral

Master

Graduate

Undergraduate

Students

Faculty

Staff

University Person

Employee

**Q3. (16 pts) Class members scope**

Suppose class A defines two public methods a1(), a2(), and a private method a3(). Also,

class B is a subclass of class A and it defines two other public methods b1() and b2().

Suppose we define two instance variables as follows:

A aObj;

B bObj;

a. Which of the above five methods are accessible (can be called) by the aObj variable?

a1(), a2(), a3()

b. Which of the above five methods are accessible (can be called) by the bObj variable?

a1(), a2(), b1(), b()2

c. Which of the above five methods are accessible (can be called) by ((B)aObj)?

a1(), a2(), b1(), b()2 Invalid Cast

d. Suppose we change the scope of the method b1() to private. Which of the above five

methods are now accessible (can be called) by the bObj variable?

a1(), a2(), a3(), b1(), b()2