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الفرع الاول

الامتحانات النهائية الدورة الاولى - للفصل الثاني
من العام الجامعي 2022-2023

المادة: Object Oriented Programming	المرحلة: الاجازة السنة الاولى
المدة: ساعتين	السنة المنهجية: 2022-2023
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Question 1:

1- For the classes A and B defined as follows:

```
class A {
  public int x;
  public A() { x=5; }
   }

class B extends A {
   public B() { x++; }
   public B(int i) { this(); x=x+i; }
   public B(String s) { super(); x- -; }
  }
```

What will the following code display?

```
B b1=new B();
B b2 =new B(2003);
B b3= new B("Hello");
System.out.println(b1.x + " and " + b2.x + " and also " + b3.x );
```

2- A class **Person** contains two attributes : a Name (**String**) and an address (**Address**). We suppose that the **Address** type is already defined.
We define the function **clone()** in two different ways indicated below in **a)** et **b)**. Indicate the result of the following code in each of the cases **a)** and **b) :**

```
public static void main(String[] args) throws CloneNotSupportedException
 {
   Adresse a=new Adresse("beirut","ULFI1");
   Personne p1=new Personne("Toto",a);

   Personne p2=(Personne) p1.clone();
   System.out.println(p1+" "+p1.getAddress()+" "+p2+"  "+p2.getAddress());
 }
```

a) `public Object clone() throws CloneNotSupportedException {`

```
Personne p= (Personne)super.clone();
p.a=(adresse) a.clone();
return p;}
```

```
b) public Object clone() throws CloneNotSupportedException {

return super.clone();}
```

3- Given that the class **Grande** inherits from the class **Petite**, find the correct line (s) among the following :

(a) Petite y =new Petite(); Grande x= (Grande)y; Petite z=x;
(b) Grande x= new Grande(); Petite y = x; Grande z=(Grande)y;
(c) Grande x= new Grande(); Petite y = x; Grande z=y;
(d) Petite y =new Petite(); Grande x= (Grande)y; Petite z=(Petite)x; Grande x=(Grande)y;

Question2:

A teacher in a university institution is an entity that gives courses. He is characterized by the price of the hour and he can give several courses. Each course is characterized by the number of hours and a title.
A researcher is another entity that spends a part of its time in research. He is characterized by its research domain (String) and the number of publications (int). A researcher and a teacher are persons who are characterized by a name, an id, year of birth.

1- Draw, in UML, the corresponding class hierarchy.
2- Write the classes in Java by defining the constructors, toString(), gets…
3- Add two functions to the class Teacher :
   a. AddCourse (…) : which adds a course to the set of courses given by the teacher.
   b. getSalary() : that returns the total price of the hours taught by the teacher. We suppose that each teacher gives completely all the hours of his courses.

Question 3:

A person is identified by a first name, a last name and an age. .

A student is derived from person and having the following characteristics:

- Student number
- Major
- An array Tab of 8 courses: the courses registered by the student (maximum 8 courses).

A course is characterized by: a code, a title and a number of credits.

1. Write in Java the classes: Person, Student and Course.
2. Add in the class person :

a. A method Add(course **c**) that allows to add the course **c** in the array Tab. If the array is full, an exception (which you must define) is raised indicating that the array is full.

b. A method remove (course **c**) that removes a course **c** from the array Tab. The elements after **c** in the array must be shifted so that the array does not have empty case. If the course c does not appear int the array Tab, this method does nothing.

3. Propose a solution to count the student having age<23.

4. Write a principal program (**main**) that allows to :

a. Create an object **e** of type student.

b. Use the method Add(course c) so that **e** is registered for 6 courses.

c. Display the titles of the courses of 6 credits registered by e.

Good Luck