

KIỂM TRA CUỐI KỲ

Môn: OBJECT ORIENTED PROGRAMMING

Thời gian: 90 phút

Học kỳ: 3 – Năm học: 2017-2018

Giảng viên: NGUYỄN MINH HUY

Tên SV:

MSSV:

(Ghi chú: Không được phép sử dụng tài liệu, ĐTDĐ, laptops)

Question 1: (3 points)

```
#include <iostream>
using namespace std;
class Animal {
private:
    char *m_sound;
public:
    Animal() { m_sound = strdup("I cannot make sound."); }
    Animal(char *sound) { m_sound = sound; }
    virtual void prepare() { cout << "I am a animal."; }
    void makeSound() {
        prepare();
        cout << m_sound << endl;
    }
};

class Sheep: public Animal {
public:
    Sheep() : Animal("Baa Baa Baa") { }
    Sheep(const Sheep &s) { }
    void prepare() { cout << "I am a sheep."; }
};

void letMakeSound(Animal *obj1, Animal obj2) {
    obj1->makeSound();
    obj2.makeSound();
}

void main() {
    Sheep obj1;
    Animal *obj2 = new Sheep(obj1);
    letMakeSound(&obj1, *obj2);
}
```



a) I am a sheep. Baa Baa Baa
I am an animal, I cannot make sound.
b) The Big Three, m_sound = strdup(sound)

Animal ("Baa ..")
Sheep ()
Animal ()
Sheep (obj)
Animal::makeSound()
Sheep::prepare()

- a) What does the above program print to screen? Describe the order of function calls in main().
b) Explain why the above program has memory leak problem. Update the program to fix the problem.
c) Implement operator >> in class Animal to enter from keyboard dynamic string for m_sound.

c) gets(temp); m_sound = strdup(temp);

Animal::makeSound()
Animal::prepare()

Question 2: (5 points)

A mobile company provides internet data service to its users. Each user selects a data plan to start using its service. There are three data plans:

- DEFAULT: user is charged based on data usage as follow: Data Cost = Unit Price x Data Usage. Data Usage is calculated based on blocks of 50 KB, and Unit Price is 75 đ per block.
- DAILY: user is not charged based on data usage but based on used days. User pays 10.000 đ daily to get 1500 MB data limit. If data usage has reached the limit before the end of the day, user must wait until the next day to continue using data service.
- MIX: like DAILY plan, user is charged based on used days. Moreover, if data usage has reached the limit before the end of the day, user can still use data service and is charged based on additional data usage like DEFAULT plan, with a discount unit price 25 đ per block.

Plan	Data Cost Description
DEFAULT	Data Cost = Unit Price * Data Usage
DAILY	Data Cost = Daily Price * Used Days
MIX	Data Cost = Daily Price * Used Days + Discount Unit Price * Additional Data Usage

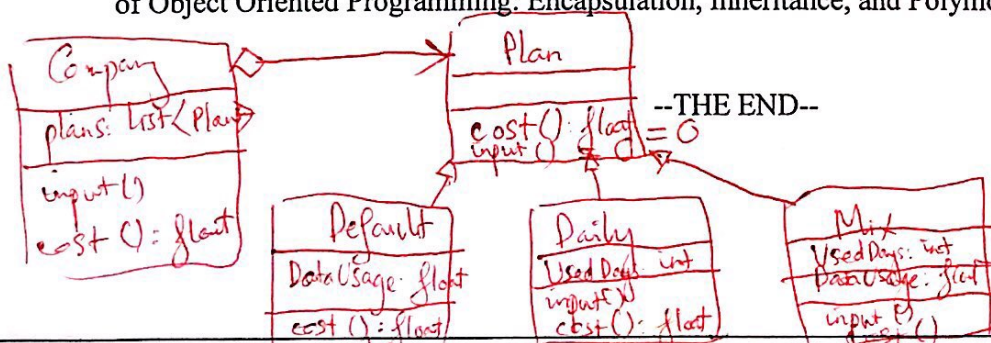
Apply Encapsulation, Inheritance, and Polymorphism, draw class diagram and write C++ program to do the followings:

- a) Enter from keyboard a list of selected data plans from all users of the company.
b) Calculate total costs that all users pay to the company.

Question 3: (2 points)

Write in English (about 10-15 lines), describe your understanding about three fundamental principles of Object Oriented Programming: Encapsulation, Inheritance, and Polymorphism.

- Encapsulation: Rule of Black Box, Tell don't ask
- Inheritance: reusability, large, derived
- Polymorphism: dynamic binding, substitutability



--THE END--

(Data Usage / 50 + 1) * 75
UsedDays * 10.000