

OOP with C++

Assignment 3

This assignment is individual assignment, every student should submit by himself.

Due: Next Section

1. True or False:

- If we want to inherit class A from class B, we can't change the access specifier of B attributes in A .
- Static variables are global variables only within the Class scope.
- We can access the static variables with the class name.
- The Addition operator (+) is the only operator which overloaded by default.
- The access specifier `public` in the inherited class will mask the access specifier `private` in the parent class.
- The keyword `This` is a pointer to an object of specific class.

2. Create a new C++ project to run the following program then answer the questions

```
1  #include <iostream>
2  using namespace std;
3
4  class Rectangle{
5
6  protected:
7      float width, length;
8      static int counter;
9  public:
10
11      Rectangle(float a, float b){
12          counter++;
13          width = a;
14          length = b;
15      }
16      float area (){
17          return (width * length);
18      }
19      int get_counter(){
20          return counter;
21      }
22      void show_data(){
23          cout<<"width of rectangle "<<counter<<"="<<width<<endl;
24          cout<<"length or rectangle "<<counter<<"="<<length<<endl;
25      }
26      Rectangle operator+(Rectangle temp)
27      {
28          temp.width+=width;
29          temp.length+=length;
30
31          return temp;
32      }
33  };
```

```

34
35 int Rectangle::counter=1;
36 int main (){
37
38
39     Rectangle r1(2,3),r2(3,2);
40     Rectangle r3=r1+r2;
41
42     cout<<r1.get_counter()<<endl;
43     cout<<r2.get_counter()<<endl;
44
45     r3.show_data();
46
47     return 0;
}
```

- a. What is the output of line 42,43?
- b. Remove the keyword `static` from line 8, run the program, and then report the output of line 42, 43 and explain the output.
- c. Revert to the original given program, and then remove line 27, run the program and report the output.
- d. Revert to the original given program, and replace line 8 with `static int counter=0;`, run the program and report the output.
- e. Revert to the original given program, and then move line 8 to line 10, run the program and report the output.
- f. Revert to the original given program, and run the program. What is the output of line 45?
- g. Rename `a` , and `b` in line 11 with `width` and `length`, and then modify the constructor to accept this modifications.
- h. Overload the operator `subtract (-)`, similar to the operator `addition (+)`.
- i. Remove line 31, run the program and then report the output of line 45 and explain the result.

3. Define a new class `Vehicle` with the following attributes

Data attributes:

- a. Public: Seats ranging from 2 to 40.
- b. Public: Wheels ranging from 4 to 12.
- c. Public:Engine.

Operations attributes:

- a. Constructor to initialize the data attributes.
- b. Distractor to clear any data defined dynamically.
- c. `Show_specs()` function to print all the vehicle information

4. Define a new class `Sedan` to inherit the class `Vehicle` in last question with the following modifications.

- d. private: Seats=4.
- e. private: Wheels=4.

- f. **private:Engine.**
- g. **protected: color.**
- h. **protected: cc.**
- i. **public: brand**

5. Define a new class Bicycle to inherit the class Vehicle in last question with the following modifications.

- a. **protected: Seats=1.**
- b. **protected: Wheels=2.**
- c. **protected:Engine.**