System device and programming

Exam 16/01/2023 C++

Exercise 10 (1.0 pt)

What value of ai will be printed?
Note that a wrong answer might imply a negative score

- 0
- 1
- 2
- 3
- Undefined behavior, because there is no synchronization between writers.

```
#include <iostream>
#include <vector>
#include <future>

using namespace std;
std::atomic<int> ai ;


void write(int n){
    ai.fetch_add(n);
}


int main () {
    ai = 0;
   vector<future<void>> writers;

    for(int i = 0; i < 3; i++){
      writers.emplace_back( async(std::launch::deferred,write,i));
    }

    cout << "ai: " << ai << endl;

    return 0;
}
```

Exercise 11 (1.0 pt)

What are the elements of vector v after the execution of the while cycle?
Note that a wrong answer might imply a negative score

- 1,3
- 0,2,4
- 1,3,5
- 0,1,2,3,4

```
#include <vector>
using namespace std;

int main() {
    int i = 0;
```

```
    vector<int> v;
    auto l = [&](int& a){i++; v.push_back(a);};

    while( i<5 ){
        l(i);
        i++;
    }

}
```

Exercize 13 (1.0 pt)

In which line of the main the copy constructor is called?
Note that a wrong answer might imply a negative score

- Line 1
- Line 2
- Line 3
- Line 4
- Line 5

```
using namespace std;

class Y {

public: //the five copy-control members
    //constructors
    Y()  { std::cout << "dc " << std::endl; } //default constructor dc
    Y(const Y &) {  std::cout << "cc" << std::endl; } //copy constructor cc
    Y(Y &&) noexcept { std::cout << "mc" << std::endl; }; //move constructor mc
    //assignments
    Y &operator=(const Y &) { std::cout << "ca" << std::endl; } //copy
assignment ca
    Y &operator=(Y &&) {std::cout << "ma" << std::endl;} //move assignment ma
    //destructor
    ~Y() { std::cout << "d" << std::endl; } //destructor d
};

Y* f_a(){ return new(Y);}
Y f_b(Y& y_b){ return Y(y_b);}

int main() {

    Y y0;    // line 1

    Y *y1 = f_a(); // line 2

    Y y2 = f_b(y0); // line 3

    delete(y1); // line 4

    return 0; //line 5
}
```

SOLUTION FOR ON/OFF VERSION

A) Answer

The use of atomics ensures that operations will be executed in atomic way. It will be printed 0 because asynch is launched with policy = deferred, therefore only until a get on the future will be called, which never happens. In order to make the asynchronous tasks effective, the following code on the main should be added:

```
for(auto& w : writers ){
     w.get();
}
```

Check also the provided code.

B) Answer

The function l() is executed only inside the while cycle, and not at its declaration. See also the provided code.

C)Answer

Copy constructor is called in line 3 because function f_b() creates a new object from the parameter passed by reference. See also the provided code.