

(\*1) 1. What does the following program do? Explain exactly and in detail.

```
#include <vector>
#include <thread>
#include <iostream>

void say_hello(int id) {
    std::cout << "Hello from thread: " << id << std::endl;
}

int main() {

    const int num_threads = 4;
    std::vector<std::thread> threads;

    // for all threads
    for (int id = 0; id < num_threads; id++)
        threads[id] = std::thread{ // call say_hello with argument id
            say_hello, id };

    for (auto& thread : threads)
        thread.join();
}
```

(\*1) 2. What does the following program do? Explain exactly and in detail. Propose an appropriate name for this program.

```
include <thread>
#include <map>
#include <string>
#include <iostream>

std::map<std::string, std::string> french

{
    {"hello", "bonjour"},
    {"world", "tout le monde"}
};

int main()
{
    std::string greet = french["hello"];
    std::thread t([&] {
        std::cout << greet << ", ";
    });
    std::string audience = french["world"];
    t.join();
    std::cout << audience << std::endl;

    return 0;
}
```