

C++ Exam: Static Variables

Instructions

- Answer all questions.
- Each question is worth 4 points.
- Write your answers clearly and concisely.
- You may use a C++ compiler to test your code.

Questions

1. Understanding Static Variables

- a. What is a static variable in C++?
- b. How does a static variable differ from a regular local variable?
- c. Provide an example of a static variable inside a function.

2. Static Variable Lifetime

- a. What is the lifetime of a static variable in C++?
- b. Explain the scope of a static variable declared inside a function.
- c. Can a static variable be accessed outside the function it is declared in? Why or why not?

3. Static Variables in Classes

- a. What is a static class member variable in C++?
- b. How do you initialize a static member variable in a class?

- c. Provide an example of a static member variable in a class and demonstrate how to access it.

4. Static Variables and Memory

- a. Where in memory is a static variable stored?
- b. How does the memory allocation for a static variable differ from that of a dynamic variable?
- c. What happens to a static variable when the program terminates?

5. Code Analysis

- a. Analyze the following code and predict the output:

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

void counter() {
    static int count = 0;
    count++;
    cout << "Count: " << count << endl;
}

int main() {
    counter();
    counter();
    counter();
    return 0;
}
```

- b. Explain why the output is what it is, focusing on the role of the static variable.

Grading

- Each question is worth 4 points.
- Partial credit may be awarded for partially correct answers.
- The total points for the exam are 20.