C and C++ Programming Assessment 3

October 18, 2025

C Multiple Choice

Each question will have four options, with each multiple choice question being worth **Two marks**.

1. What is the size of a `double` on most systems?
   - A) 4 bytes
   - B) 8 bytes
   - C) 16 bytes
   - D) 32 bytes
2. Which of the following is NOT a valid C data type?
   - A) short
   - B) long
   - C) string
   - D) char
3. What will this code output?

```
        int x = 3;
        printf("%d", ++x + x++);

```

   - A) 7
   - B) 8
   - C) 9
   - D) Undefined Behavior
4. What is wrong with the following code?

```
        int *ptr;
        *ptr = 10;

```

   - A) Pointer not initialized
   - B) Incorrect dereference syntax
   - C) Invalid assignment
   - D) Nothing is wrong
5. Which of the following is guaranteed to execute its condition check before the loop body?
   - A) do-while
   - B) while
   - C) for
   - D) Both B and C
6. What does the `sizeof` operator return for an array passed to a function?
   - A) Size of the entire array
   - B) Size of the first element

- C) Size of a pointer
- D) Number of elements

7. What is wrong with the following code?

```
        int arr[5] = {1, 2, 3};
        for (int i = 0; i <= 5; i++) {
            printf("%d ", arr[i]);
        }

```

- A) Loop condition is incorrect
- B) Array initialization is invalid
- C) Missing format specifier
- D) Nothing is wrong

8. What is the purpose of the `const` keyword in C?
   - A) Defines a variable as immutable
   - B) Allocates memory dynamically
   - C) Restricts function scope
   - D) Enables inline expansion
9. Which of the following declares a 2D array correctly?
   - A) int arr[3,3];
   - B) int arr[3][3];
   - C) int arr(3)(3);
   - D) int *arr[3][3];
10. What is wrong with this code?

```
        FILE *fp = fopen("test.txt", "r");
        fscanf(fp, "%d");

```

- A) Missing variable in fscanf
- B) File not checked for NULL
- C) Incorrect file mode
- D) Nothing is wrong

C++ Multiple Choice

1. Which of the following is a feature of C++ but not C?
   - A) Pointers
   - B) References
   - C) Arrays
   - D) Structures
2. What is wrong with this class definition?

```
class Test {
    int data;
public
    void setData(int d);
};

```

   - A) Missing colon after public
   - B) Missing semicolon after class
   - C) Missing function implementation
   - D) Nothing is wrong
3. What does the `override` keyword ensure in C++?
   - A) Function is virtual
   - B) Function overrides a base class virtual function
   - C) Function is static
   - D) Function is inline
4. What is wrong with this code?

```
class Example {
public:
    Example() {
        int x = 0;
        return x;
    }
};

```

   - A) Constructors cannot declare variables
   - B) Constructors cannot return values
   - C) Constructor name is incorrect
   - D) Nothing is wrong
5. What does the `this` pointer refer to in a C++ class?
   - A) Current class definition
   - B) Current object instance
   - C) Base class instance
   - D) Static member

6. What is the error in this code?

```
        int *ptr = new int;
        delete[] ptr;

```

   - A) Incorrect deletion syntax for single object
   - B) Memory leak
   - C) Pointer not initialized
   - D) Nothing is wrong

7. What is the purpose of operator overloading in C++?
   - A) To redefine operators for user-defined types
   - B) To prevent operator usage
   - C) To restrict operator scope
   - D) To inline operator functions

8. Which keyword prevents a class from being inherited?
   - A) sealed
   - B) final
   - C) private
   - D) static

9. What is the difference between `struct` and `class` in C++?
   - A) Default access specifier
   - B) Memory allocation method
   - C) Inheritance support
   - D) Function definition scope

(Last question on the next page)

10. What will be the output of this code?

```
        class Base {
        public:
            virtual void print() {
                cout << "Base";
            }
        };
        class Derived : public Base {
        public:
            void print() override {
                cout << "Derived";
            }
        };
        int main() {
            Base *b = new Derived();
            b->print();
            delete b;
        }

```

- A) Base
- B) Derived
- C) Compilation Error
- D) Undefined Behavior

C Creative Question

C Programming Topic: Array Reversal

1. Define an integer array with the following specifications:

   The array should contain 8 elements: `{5, 10, 15, 20, 25, 30, 35, 40}`. Declare this array in the main function and print all its elements to confirm initialization.

   (4 marks)

2. Write a function named `reverseArray` that performs the following tasks:

   Accept the `array` and its `size` as arguments. Reverse the array in place using a loop. Return void, as the array is modified directly.

   (8 marks)

3. Modify the `main` function to use the `reverseArray` function:

   Call the `reverseArray` function. Print the array elements after reversal to confirm the operation.

   (8 marks)

4. Write a function named `findDuplicates` that performs the following:

   Accept the array and its size as arguments. Check for duplicate elements in the array. Print any duplicates found in the main function after calling `findDuplicates`.

   (6 marks)

5. Write a function to calculate the range of the array elements:

   Accept the array and its size as arguments. Calculate the range (difference between max and min elements). Return the range and print it in the main function.

   (4 marks)

C++ Creative Question

Be careful with the formatting of your answer; it should be easy to read.

1. Define a `Book` class with the following specifications:

   Private member variables: `title` (a string) to store the book's title. `ratings` (an array of 4 floats) to store reader ratings. `isbn` (an integer) to store the book's ISBN number.

   Public member functions: A constructor to initialize the title, ratings, and ISBN for each book.

   (5 marks)

2. Write a member function named `calculateAverageRating` in the `Book` class that:

   Computes the average of the ratings stored in the `ratings` array. Returns the calculated average as a `float`.

   (5 marks)

3. Add a member function named `isHighlyRated` to the `Book` class that:

   Uses `calculateAverageRating` to check if the average rating is 4.0 or higher. Returns `true` if the average rating is 4.0 or higher, `false` otherwise.

   (5 marks)

4. Write a member function named `displayBookInfo` in the `Book` class that:

   Displays the book's title, ISBN, ratings, average rating, and rating status in the following format:

   Title: The Great Gatsby
   ISBN: 123456789
   Ratings: 4.5 4.0 3.8 4.2
   Average Rating: 4.13
   Status: Highly Rated

Part 4 (final part) on the next page

5. In the main function, perform the following:

   Create two `Book` objects using the constructor. For example:

   Book 1: Title: "The Great Gatsby", ISBN: 123456789, Ratings: {4.5, 4.0, 3.8, 4.2}
   Book 2: Title: "1984", ISBN: 987654321, Ratings: {3.5, 3.0, 3.2, 3.8}

   Call the `displayBookInfo` function for both books to test all functionalities.

   (10 marks)