COMP3400-R-30
2020 Winter, Jan. 28, 2020 in ER 2123
University of Windsor, School of Computer Science

Midterm 1 Examination

Instructor: Mr. Paul Preney

Student ID:	
FIRST Name:	
LAST Name:	

"I have neither given nor received unauthorized help with this examination.
Any suspicion of cheating will automatically void my mark on this examination."

_____

Signature

Unsigned examination booklets will not be graded.

Signature implies agreement with the above statement in quotes.

INSTRUCTIONS:

1. You have **1 hour** maximum to complete this examination. Pace yourself accordingly.
2. Write your answers in the space provided. No additional space will be provided.
3. Do **not** remove any papers from this booklet or add new ones.
4. You may **not** use any reference materials or books.
5. Ensure that you have all **8 pages** of this examination (including this page) before starting to write this exam. If you don't bring this to the attention of the instructor immediately.
6. Write/print legibly: illegible answers (or portions thereof) will not receive marks.

SCORE: _____ / 44

Part I

Multiple Choice and Short Answer Questions

For each question in this section, neatly and clearly **circle, check, or underline** the **single best response** which most correctly completes/answers the statement/question given for multiple choice or true/false style questions, otherwise write in the appropriate answer(s) in the space provided appropriate for that question. Read carefully! Unintelligible or ambiguous responses will receive a mark of zero (0) for that question, so ensure that your answer is clear.

1. (1 point) C++ "borrowed" its `class` concepts including derived classes and virtual functions from the programming language _____.

   ◯ APL
   ◯ C
   ◯ Python
   ◯ Simula
   ◯ Smalltalk

2. (2 points) What is today called C++ was created at Bell Labs in 1979 by Bjarne Stroustrup. (Correctly spell the person's first and last name in your answer.)

   2. _____

3. (1 point) C++ is a language and a complete system.

   ◯ True
   ◯ False

4. (1 point) The design of C++ prevents all misuses of a useful feature.

   ◯ True
   ◯ False

5. (1 point) C++ is a _____-typed programming language.

   5. _____

6. (1 point) The design of C++ permits no implicit violations of the static type system.

   ◯ True
   ◯ False

7. (1 point) The zero-overhead rule means, "What you don't use, you don't pay for."

   ◯ True

   ◯ False

8. (2 points) The creator of C++ describes C++ in early documents as (select all that apply with penalties for incorrect selections):

   ◯ C++ is a better C.

   ◯ C++ is a better Fortran.

   ◯ C++ is a general-purpose programming language.

   ◯ C++ is an object-oriented programming language.

   ◯ C++ is a special-purpose programming language.

   ◯ C++ supports data abstraction.

   ◯ C++ supports objects having types not encountered at compile-time.

   ◯ C++ supports object-oriented programming.

9. (1 point) Everything in the C++ Standard Library is in the _____std_____ namespace.

   9. _____

10. (1 point) Defining a function having the same name as another function but with different argument types is _____.

    ◯ an error

    ◯ called function overriding

    ◯ called function overloading

11. (1 point) C++ permits one to use _____ as digit separators to make long (literal) numeric values more readable for humans.

    11. _____

12. (1 point) Briefly explain what the compiler does to determine the type of the variable `v` in the declaration `auto v = expression;`.

    _____

    _____

    _____

13. (1 point) A variable that is `const` means it is _____ which is enforced by the compiler.

    13. _____

14. (1 point) In C++, a declaration's type whose rightmost punctuation character(s) are either `&` or `&&` declares a _____.

14. _____

15. (2 points) Using a range-for-statement, output all elements in the container, `v`, to `cout` with **each element** followed by a `'\n'`. The container is declared as `std::vector<double> v;`. (Only write the range-for-statement snippet in your answer.)

16. (1 point) Explain what a container's `begin()` function returns and what it refers to.

17. (2 points) Explain what a container's `end()` function returns and what it "refers" (or not) to. (Be careful with and ensure your answer is clear.)

a container's end function returns an iterator. This iterator points to the element following the last element in the container. This element is theoretical and the end pointer cannot be dereferenced. It is a place holder for loops and algorithms

18. (2 points) A programmer wants to `#include <math.h>` in a C++ program. Briefly explain what must be done (to any C header file —not just `<math.h>`) to `#include` such headers in a C++ program and, as an example, write how `#include <math.h>` would be written in a C++ program.

19. (2 points) Explain what a predicate is in the C++ Standard Library.

20. (1 point) The imperative programming paradigm defines computation in terms of programming statements that describe changes in _____.

    20. _____

21. (2 points) When using IOStreams objects, e.g., `cin`, Prof. Preney often used the stream object in contexts requiring a `bool` value, e.g., `while (cin >> i) /* code */;` and `if (cin) /* code */;`. With such, what do the `true` and `false` results mean with respect to the stream?

Part II

General Questions

Answer all parts of each question in the space provided below each question. You are expected to answer questions using complete sentences and proper grammar. If the answer has program code/-diagrams, write the code fragment(s) or the diagram portion(s) that answers the question **unless you are explicitly asked to write a full-and-complete program or diagram.** Unless stated otherwise in the question, your answers can assume `using namespace std;` and all needed `#include` files have been included somewhere earlier above your code.

Questions II.1 and II.2 use this `struct`:

```
struct record
{
  unsigned count;
  double priority;
};
```

1. (6 points) Write the **operator overload** to output `record` objects to an IOStream, e.g., `cout`. A space character must separate the output of a `record` object's members.

2. (6 points) Write the **operator overload** to input `record` objects from an IOStream, e.g., `cin`. Your code must read in output produced by the code in the previous question into the `record` passed to the function. (If you've no code in the previous question then your code must read in the count followed by priority.) Don't write any error checking in your answer: assume the input is always valid.

3. (4 points) Write the **code fragment** to read in all `int` values from `cin` using a single `while` loop into the variable **v** whose type is `vector<int>`. Any stream error, failure, or end-of-file must terminate the `while` loop. (Remember to declare all variables used.)

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