Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ECE 2036 Test II**

Open book and notes, PCs and tablets allowed, but no Internet Access and code cannot be run on a PC

1. (*10%*) Assuming the short C/C++ code segment below compiles, what is output?

 string str("Hello C/C++ String World");

 string mystr;

 mystr=str.substr(6,6);

 cout << mystr << hex << str.length() << str[6] << mystr.length();

cout.put(65).put(66);

cout << endl;

Output: *C/C++ 18C6AB*

1. (*5%*) What happens if an exception is thrown outside of a try block?

*Terminate is called, the program stops execution and a default error message may be displayed.*

1. (*15%)* Write a C/C++ template definition that automatically generates a function called “smaller” that returns the smaller of two values of the same type (i.e., small(2, 3) returns 2 or small(3.0, 2.0) returns 2.0). You can assume that the “<” operator is defined for any type that is used with the template.

*template <class myType>*

 *myType smaller (myType a, myType b) {*

 *if (a<b) return a;*

*else return b;*

 *}*

1. (*5%*) C uses the two functions \_\_\_*malloc\_*\_\_\_ and \_\_\_\_*free*\_\_\_\_\_ for dynamic memory

management, and C++ uses \_\_\_\_\_*new*\_\_\_\_ and \_\_\_\_*delete*\_\_\_\_\_\_\_ . If these do not match up during program execution so that any dynamically allocated memory is returned when no longer

needed, a type of error occurs that is called a \_*memory\_\_\_ \_\_\_leak\_\_\_\_\_.*

1. (*10%*) If a new class definition needs dynamic memory allocation, the user also typically needs to

provide (i.e., not use the default) code for the classes’ \_\_\_\_*constructor*\_\_\_\_\_\_\_\_\_,

\_\_*copy\_\_\_\_\_\_ \_\_constructor*\_\_, and \_\_\_\_*destructor*\_\_\_. It is also likely that the user

will want to overload the \_\_\_\_*assignment or “=”*\_\_\_\_\_\_\_\_ operator (first before the other operators).

1. (*10%*) In a class that uses dynamic memory allocation for member data, assuming “A=B;” works some special code is also needed so that a statement like “A=A;” will work properly (i.e., A and B are objects from the new class).

This is called \_\_*self\_\_\_\_ \_assignment*\_\_\_\_\_\_\_\_\_\_\_\_\_ and code to handle it is typically

placed in the \_\_*assignment\_\_\_\_\_\_\_\_\_ \_\_\_\_operator*\_\_\_\_\_\_\_\_\_\_\_\_ overload.

Write a C++ statement in the space below that is typically added to solve the “A=A;” problem.

*if (rhs != this){ if (rhs==this) return;*

*//code to copy object OR*

*}*

1. (*5%*) If only a pointer is passed to an object that is from a derived class that contains virtual functions, how does the program find the correct virtual function code at runtime?

*Objects with a virtual function have a pointer to the object’s virtual function table. The virtual function table has a pointer to each of the object’s virtual functions.*

1. (*20%*) Write the output in the space below that is produced by the Constructor Destructor example C/C++ code provided with the test. Recall that most compilers use the copy constructor to make a new copy of the object whenever pass by value is used (instead of a pass by reference).

Assume this also includes functions that return a value.



1. (*20%*) Write the output in the space below that is produced by the Inheritance and Polymorphism example C/C++ code provided with the test.

