Spring Semester 15, Dr. Punch. Exam #3 (5/7), form 3 A

Last name (printed): ____________________________________________________________

First name (printed): __________________________________________________________

Directions:

a) DO NOT OPEN YOUR EXAM BOOKLET UNTIL YOU HAVE BEEN TOLD TO BEGIN.
b) You have 120 minutes to complete the exam (7:45-9:45)
c) This exam booklet contains 40 multiple choice questions, each weighted equally (5 points). **6 double-sided pages in total**
d) You may use one 8.5" x 11" note sheet during the exam. No other reference materials or calculating devices may be used during the examination.
e) Questions will not be interpreted during the examination.
f) You should choose the single best alternative for each question, even if you believe that a question is ambiguous or contains a typographic error.
g) Please fill in the requested information at the top of this exam booklet.
h) Use a #2 pencil to encode any information on the OMR form.
i) Please encode the following on the OMR form:
   - Last name and first initial
   - MSU PID
   - Exam form (see the title of this page)
j) Please sign the OMR form.
k) Only answers recorded on your OMR form will be counted for credit.
l) Completely erase any responses on the OMR form that you wish to delete.
m) You must turn in this exam booklet and the OMR form when you have completed the exam. When leaving, please be courteous to those still taking the exam.

Good luck.

**Timing tip.** A rate of 2.75 minutes per multiple choice problem leaves 10 minutes to go over any parts of the exam you might have skipped.
1) For the program in Figure 1, what type is \texttt{i} on Line 1?
   a) \texttt{long}
   b) \texttt{int}
   c) \texttt{char}
   d) \texttt{void}
   e) None of the above.

2) For the program in Figure 1, what is the result if Line 2 were uncommented?
   a) run-time error
   b) the proper/correct value of \texttt{i} would be printed
   c) compile-time error
   d) an unpredictable value would be printed
   e) None of the above.
3) For the program in Figure 1, what output is given by Line 3?
   a) 16
   b) 25
   c) 35
   d) 0
   e) None of the above.

4) For the program in Figure 1, what output is given by Line 4?
   a) 10
   b) 20
   c) 40
   d) 60
   e) None of the above.

5) For the program in Figure 1, what output is given by Line 5?
   a) 10
   b) 20
   c) 40
   d) 60
   e) None of the above.

6) For the program in Figure 1, what output is given by Line 6?
   a) 10
   b) 20
   c) 40
   d) 60
   e) None of the above.

7) For the program in Figure 1, what output is given by Line 7?
   a) 10
   b) 20
   c) 40
   d) 60
   e) None of the above.
8) Which of the following is a requirement(s) for a properly written recursive function?
   a) provide a base case
   b) only 1 argument is allowed
   c) the function cannot call itself.
   d) All of the above
   e) None of the above

9) Which of the following is true about a C++ tree container data structure?
   a) if it contains any values then there would be a root node
   b) it cannot be empty
   c) each node can only have two children
   d) All of the above
   e) None of the above

10) What is the size of a C++ pointer (how many bytes)?
    a) same size as the type it points to
    b) 2 bytes
    c) 4 bytes
    d) Depends on the range of values of the operating system (32 bit, 64 bit, etc.)
    e) None of the above.

11) Which of the following are true about a basic array data structure (not the C++ array)?
    a) It is of fixed size.
    b) Can use generic algorithms on an array via use of pointers.
    c) First value is at index 0.
    d) All of the above.
    e) None of the above

12) Which of the following data structures would be appropriate to implement a stack?
    a) array
    b) vector
    c) linked list
    d) All of the above
    e) None of the above

13) Which of the following is required to utilize the STL generic sort algorithm on an entire container's value?
    a) An iterator/pointer to the last element.
    b) An iterator/pointer to the first element.
    c) A container of only numeric elements.
    d) All of the above
    e) None of the above

14) When is a class's copy constructor invoked?
    a) It can be explicitly invoked
    b) It is invoked when a class instance is passed to a function.
    c) It is invoked when a class instance is returned from a function
    d) All of the above
    e) None of the above
15) For the program in Figure 2, what type is i on Line 1?
   a) vector::iterator
   b) pair<long,long>
   c) vector<pair<long,long>>::iterator
   d) long
   e) None of the above
16) For the program in Figure 2, what type is \( i \) on Line 2?
   a) vector::iterator
   b) pair<long,long>
   c) vector<pair<long,long>>::iterator
   d) long
   e) None of the above

17) For the program in Figure 2, what value is output on Line 3?
   a) 0
   b) 3
   c) 6
   d) 9
   e) None of the above

18) For the program in Figure 2, what value is output on Line 4.
   a) 0
   b) 3
   c) 6
   d) 9
   e) None of the above

19) For the program in Figure 2, what value is output on Line 5.
   a) 0
   b) 3
   c) 6
   d) 9
   e) None of the above

20) For the program in Figure 2, what value is output on Line 6.
   a) 0
   b) 3
   c) 6
   d) 9
   e) None of the above
```cpp
#include<iostream>
using std::cout; using std::endl; using std::ostream;
using std::boolalpha;
#include<string>
using std::string;
#include<map>
using std::map;

struct MyStruct{                        // Line 1
    long l_;                         
    string s_;                       
    map <long, string> m_;           

    MyStruct(long, string s="");   
    bool method1(long, string s="");
};

MyStruct::MyStruct(long l, string s){   // Line 2
    l_ = l;                           
    s_ = s;                           
    m_[l] = s;                        
}

bool MyStruct::method1(long l, string s){
    if (m_.count(l))
        return false;
    else{
        l_ = l;
        s_ = s;
        m_[l] = s;
    }
    return true;
}

ostream& operator<<(ostream& out, MyStruct& ms){
    out << ms.l_ << ":" << ms.s_ << ":" << ms.m_.size() << endl;
    return out;
}

int main (){
    cout << boolalpha;
    MyStruct ms1(1957, "bill");
    MyStruct ms2(1984, "sarah");

    cout << ms1 << endl;                   // Line 3
    cout << ms2.method1(1999) << endl;    // Line 4
    cout << ms2 << endl;                  // Line 5
    cout << ms1.method1(1957, "irving") << endl; // Line 6
    cout << ms1 << endl;                  // Line 7
}
```
21) For Figure 3, which of the following best describes the privacy settings of the MyStruct structure on Line 1?
   a) everything is public
   b) everything is private
   c) variables are private, functions/methods are public
   d) variables are public, functions/methods are private
   e) None of the above

22) For Figure 3, which of the following most accurately describes the function/method listed beginning at Line 2?
   a) default constructor
   b) copy constructor
   c) destructor
   d) 2 arg constructor
   e) None of the above

23) For the program in Figure 3, what output is produced by Line 3?
   a) 1957:bill:1
   b) 1957:bill:0
   c) 1957::1
   d) true
   e) None of the above

24) For the program in Figure 3, what output is produced by Line 4?
   a) 0
   b) 1
   c) false
   d) true
   e) None of the above

25) For the program in Figure 3, what output is produced by Line 5?
   a) 1984:sarah:1
   b) 1984:sarah:0
   c) 1999::1
   d) true
   e) None of the above

26) For the program in Figure 3, what output is produced by Line 6?
   a) 0
   b) 1
   c) false
   d) true
   e) None of the above

27) For the program in Figure 3, what output is produced by Line 7?
   a) 1957:bill:1
   b) 1957:bill:0
   c) 1957::2
   d) true
   e) None of the above
Figure 4 is one program. Program starts in column 1 and continues in column 2

28) For the program in Figure 4, what output is produced by Line 1? 
   a) 0  
   b) 2  
   c) 4  
   d) 1  
   e) None of the above 

29) For the program in Figure 4, what output is produced by Line 2? 
   a) 0  
   b) 2  
   c) 4  
   d) 1  
   e) None of the above
30) For the program in Figure 4, what output is produced by Line 3?
   a) 0
   b) 2
   c) 4
   d) 1
   e) None of the above
31) For the program in Figure 4, what output is produced by Line 4?
   a) 0
   b) 2
   c) 4
   d) 1
   e) None of the above
32) For the program in Figure 4, what output is produced by Line 5?
   a) 0
   b) 2
   c) 4
   d) 1
   e) None of the above
33) For the program in Figure 4, which of the methods reflects a copy and swap idiom?
   a) constructor
   b) copy constructor
   c) method1
   d) method2
   e) None of the above
34) For the program in Figure 4, which of the following describe the MyClass class?
   a) it leaks
   b) it takes the default destructor
   c) it grows its array as needed
   d) All of the above
   e) None of the above
Figure 5 is one program. Program starts in column 1 and continues in column 2.

35) For the program in Figure 5, what output is produced on Line 1?
   a) 27
   b) 0
   c) 1
   d) 2
   e) None of the above

36) For the program in Figure 5, what output is produced on Line 2?
   a) 0,
   b) 1,
   c) 27,
   d) a blank line
   e) None of the above
37) For the program in Figure 5, what output is produced by Line 3?
   a) 27
   b) 0
   c) 1
   d) 123
   e) None of the above

38) For the program in Figure 5, what output is produced by Line 4?
   a) 123,27,
   b) 27,123,
   c) 123,
   d) 27,
   e) None of the above

39) For the program in Figure 5, what output is produced by Line 5?
   a) 456
   b) 123
   c) 2
   d) 0
   e) None of the above

40) For the program in Figure 5, what output is produced by Line 6?
   a) 123,27,
   b) 27,123,
   c) 123,
   d) 27,
   e) None of the above