Spring Semester 14, Dr. Punch. Exam #2 (3/20), form 2 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 80 minutes to complete the exam (10:20-11:40)
c) This exam booklet contains 30 multiple choice questions, each weighted equally (5 points). 6, double-sided, pages 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 2.5 minutes per multiple choice problem leaves 5 minutes to go over any parts of the exam you might have skipped.
1) What output is produced by Line 2 in Figure 1?
   a) 0  
   b) 1  
   c) 2  
   d) 3  
   e) None of the above.

2) What output is produced by Line 3 in Figure 1?
   a) 11  
   b) 12  
   c) 13  
   d) 14  
   e) None of the above.

3) What output is produced by Line 4 in Figure 1?
   a) empty string  
   b) smaller  
   c) larger  
   d) equal  
   e) None of the above.
4) What output is produced by Line 5 in Figure 1?
   a) empty string
   b) smaller
   c) larger
   d) equal
   e) None of the above.

5) For the program in Figure 1, what effect does Line 1 have on cout output?
   a) all integers printed as floating point numbers.
   b) all Booleans printed as integers.
   c) Booleans printed as true or false
   d) all strings of the form "true" or "false" converted to Booleans.
   e) None of the above
6) Which of the following is true about generic algorithms?
   a) they are templated
   b) they utilize iterators
   c) they operate on collections
   d) All of the above
   e) None of the above
7) Which of the following are true about v.end() on a vector<long> v?
   a) it returns a vector element
   b) it is an iterator that points to the last element
   c) it returns the size of the vector
   d) the position of the largest long in the vector.
   e) None of the above
8) What is the meaning of the & operator
   a) used to create a reference variable
   b) used to get the address of a variable
   c) used to pass a reference to a function
   d) depends on the context
   e) None of the above.
9) What is the meaning of cin.clear()?
   a) clears any errors, resets cin to be "good"
   b) removes all characters from the input stream.
   c) undo the last input operation
   d) closes the cin stream
   e) None of the above
10) What is meaning of the keyword auto in a type declaration?
    a) The variable doesn't have to have a type.
    b) The variable value is automatically converted to an integer.
    c) The compiler will try to deduce the type of the variable
    d) The memory required for the variable is automatically generated
    e) None of the above
11) Which of the following are true about C++ functions?
    a) You cannot have more than one function with the same name.
    b) C++ uses the types of the parameters and return value to differentiate functions
       with the same name
    c) a function must have at least one parameter
    d) the first parameter of a function does not require any type information
    e) None of the above
12) Which of the following generic algorithms would you use to multiply all the values of
    a vector together into a single result
    a) copy
    b) transform
    c) sort
    d) accumulate
    e) None of the above
Figure 2

13) For the program in Figure 2, give the output of Line 2.
   a) 0
   b) 1
   c) 2
   d) 3
   e) None of the above

14) For the program in Figure 2, give the output of Line 3.
   a) 6
   b) 5
   c) 4
   d) 0
   e) None of the above
15) For the program in Figure 2, give the output of Line 4.
   a) 5
   b) 10
   c) 6
   d) 11
   e) None of the above
16) For the program in Figure 2, give the output of Line 5.
   a) 0
   b) 1
   c) 5
   d) 10
   e) None of the above
17) For the program in Figure 2, give the output of Line 6.
   a) 0
   b) 20
   c) 40
   d) 36
   e) None of the above
18) For the program in Figure 2, what type is size_t in Line 1.
   a) a pointer
   b) a reference to a long
   c) an unsigned integer
   d) a long
   e) None of the above
19) For the program shown in Figure 3, what output is produced by Line 2?
   a) 0
   b) 1
   c) 2
   d) 3
   e) None of the above

20) For the program shown in Figure 3, what output is produced by Line 3?
   a) 0
   b) 1
   c) 2
   d) 3
   e) None of the above
21) For the program shown in Figure 3, what output is produced by Line 4?
   a) 0
   b) 1
   c) 2
   d) 3
   e) None of the above

22) For the program in Figure 3, if Line 1 were commented out, what would be the new output for Line 3?
   a) 0
   b) 1
   c) 2
   d) 3
   e) None of the above
```cpp
#include<iostream>
using std::cout; using std::endl;
#include<vector>
using std::vector;
#include<string>
using std::string; using std::to_string;
#include<sstream>
using std::stringstream;
#include<utility>
using std::pair;
#include<algorithm>
using std::transform; using std::copy;
#include<iterator>
using std::ostream_iterator;

string f1 (pair<long, long> &p){
    string result;
    result = to_string(p.first) + "":"" + to_string(p.second);
    return result;
}

int main (){  
    pair<long, long> p1(1,1);
    pair<long, long> p2(2,2);
    stringstream oss;
    vector<pair<long, long>> v;
    v.push_back(p1);
    v.push_back(p2);
    auto res = f1(p1);              // Line 1
    cout << res << endl;            // Line 2
    copy(v.begin(), v.end(), back_inserter(v));
    cout << v.size() << endl;       // Line 3
    transform(v.begin(), v.end(), ostream_iterator<string>(oss, ""), f1);
    auto val = oss.str();
    cout << val.substr(4, 3) << endl;  // Line 4
}
```

23) For the program in Figure 4, what type is res on Line 1?
   a) long
   b) integer
   c) string
   d) pair<long, long>
   e) None of the above

24) For the program in Figure 4, what value is printed by Line 2?
   a) 1:1
   b) 1,1
   c) 11
   d) No Output occurs
   e) None of the above
25) For the program in Figure 4, what value is printed by Line 3?
   a) 0
   b) 2
   c) 4
   d) 6
   e) None of the above

26) For the program in Figure 4, what value is printed by Line 4?
   a) 1:1
   b) :1,
   c) 2:2
   d) :2,
   e) None of the above
```cpp
#include<iostream>
using std::cout; using std::endl;
#include<vector>
using std::vector;
#include<string>
using std::string;
#include<algorithm>
using std::swap;

template<typename Itr, typename T>
void my_fun(Itr f, Itr b, T val){
    for(auto p = f; p != b; p++)
        *p = *p + val;
}

int main () {
    vector<long> v{1,2,3,4,5};
    vector<string> s = {"abc", "def", "ghi"];

    cout << *(v.end()-1) << endl; // Line 2
    my_fun(v.begin(), v.end(), 5);
    my_fun(s.begin(), s.end(), "z");
    cout << v[0] << endl; // Line 3
    cout << s[0] << endl; // Line 4
}
```

**Figure 5**

27) For the program in Figure 5, what output is produced by **Line 2**?
   a) 1
   b) 5
   c) 3
   d) 4
   e) None of the above

28) For the program in Figure 5, what output is produced by **Line 3**?
   a) 6
   b) 7
   c) 8
   d) 9
   e) None of the above

29) For the program in Figure 5, what output is produced by **Line 4**?
   a) abc
   b) def
   c) ghi
   d) z
   e) None of the above
30) What type is `val` on Line 1 for the invocation on Line 4?
   a) string
   b) string::iterator
   c) long
   d) vector<string>::iterator
   e) None of the above