Fall Semester 13, Dr. Punch. Exam #3 (12/12), 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). **8 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.

**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   2   3   4   5   6   7   8   9  10
B   C   E   D   A   D   C   D   B   B

11  12  13  14  15  16  17  18  19  20
E   A   E   A   C   B   B   D   E   A

21  22  23  24  25  26  27  28  29  30
A   B   E   D   C   E   C   D   B   A

31  32  33  34  35  36  37  38  39  40
C   A   E   D   D   A   BD  C   BD
```
1) What output is produced by **Line 1** in Figure 1?
   a) p
   b) :
   c) n
   d) empty string
   e) None of the above.

2) What output is produced by **Line 2** in Figure 1?
   a) 3
   b) 4
   c) 8
   d) 7
   e) None of the above.

3) What output is produced by **Line 3** in Figure 1?
   a) 3
   b) 4
   c) 8
   d) 7
   e) None of the above.

4) What output is produced by **Line 4** in Figure 1?
   a) yep
   b) : 
   c) nope
   d) :nope
   e) None of the above.

5) What output is produced by **Line 5** in Figure 1?
   a) 3
   b) 4
   c) 8
   d) 7
   e) None of the above.
6) Which Big-Oh notation below represents the "slowest" algorithm?
   a) O(n^2)
   b) O(n^3)
   c) O(n \cdot \log(n))
   d) O(n^n)
   e) None of the above

7) Which of the following best describes a template class?
   a) a class that is type independent
   b) a class with extra type information
   c) a pattern used to make a class
   d) the top level class in the C++ hierarchy
   e) None of the above

8) Which of the following are required for a binary search on some data structure?
   a) That the size of the data structure be known.
   b) That the data structure is sorted.
   c) That you can compare two elements of the data structure to see which is smaller.
   d) All of the above
   e) None of the above.

9) Which of the following describes the term "memory leak"?
   a) An undeclared array.
   b) Some memory that was created but not deleted.
   c) A pointer that points to the nullptr
   d) Memory that is untyped.
   e) None of the above

10) Which of the following are an advantage of an STL list vs an STL vector?
    a) Lists can grow on demand, vectors cannot.
    b) List manipulation for operations like insert, delete are much faster.
    c) Lists are better at random access (the operator[] function).
    d) All of the above
    e) None of the above

11) Which of the following are true with respect to C++ structs and C++ classes?
    a) Only classes can have member functions.
    b) Only structs can have public data elements.
    c) Only classes can have constructors.
    d) All of the above
    e) None of the above

12) Which of the following are true about basic C++ arrays?
    a) you can use pointers into an array to work with generic algorithms.
    b) their size can grow and shrink during the running of the program.
    c) they do not require type information to be created.
    d) All of the above
    e) None of the above
For the program in Figure 2, what is an equivalent type for `size_t` in Line 1?

a) long  
b) long*  
c) bool  
d) int  
e) None of the above

For the program in Figure 2, what type is `val` in Line 2?

a) long  
b) long*  
c) bool  
d) int  
e) None of the above

For the program in Figure 2, give the output of Line 3.

a) 2  
b) 3  
c) 4  
d) 5  
e) None of the above
16) For the program in Figure 2, give the output of Line 4.
   a) 10
   b) 30
   c) 0
   d) 3
   e) None of the above

17) For the program in Figure 2, give the output of Line 5.
   a) 10
   b) 30
   c) 0
   d) 3
   e) None of the above

18) For the program in Figure 2, give the output of Line 6.
   a) 10
   b) 30
   c) 0
   d) 3
   e) None of the above
19) For the program in Figure 3, what type is val on Line 1?
   a) string
   b) long
   c) pair<string, long>
   d) pair<long, string>
   e) None of the above

20) For the program in Figure 3, what type is val->first on Line 2?
   a) string
   b) long
   c) pair<string, long>
   d) pair<long, string>
   e) None of the above
21) For the program in Figure 3, what output is produced by Line 3?
   a) 3
   b) 4
   c) 5
   d) 14
   e) None of the above

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

23) For the program in Figure 3, what output is produced by Line 5?
   a) 1
   b) 2
   c) 3
   d) 4
   e) None of the above
24) For the program in Figure 4, what value is printed by Line 1?
   a) 0  
b) 10  
c) 456  
d) 123  
e) None of the above

25) For the program in Figure 4, what value is printed by Line 2?
   a) 126  
b) 789  
c) 876  
d) 123  
e) None of the above

26) For the program in Figure 4, what value is printed by Line 3?
   a) 5  
b) 6  
c) 7  
d) 8  
e) None of the above
27) For the program in Figure 4, what value is printed by Line 4?
   a) 0
   b) 10
   c) 1
   d) 1752
   e) None of the above

28) For the program in Figure 4, what value is printed by Line 5?
   a) 0
   b) 10
   c) 1
   d) 1752
   e) None of the above
29) For the program in Figure 5, what output is produced by Line 1?
   a) 10
   b) 10:abc
   c) abc
   d) 1:xyz
   e) None of the above

30) For the program in Figure 5, what output is produced on Line 2?
   a) abcxyz
   b) xyzabc
   c) abc:xyz
   d) xyz:abc
   e) None of the above
31) For the program in Figure 5, what output is produced by Line 3?
   a) 10:abc9
   b) 10:abc90
   c) 90
   d) 10
   e) None of the above

32) For the program in Figure 5, what output is produced by Line 4?
   a) 10:abc9
   b) 10:abc90
   c) 90
   d) 10
   e) None of the above
33) For the program in Figure 6, what output is produced by Line 1?
   a) 10  
   b) 20  
   c) 30  
   d) 40  
   e) None of the above

34) For the program in Figure 6, what output is produced on Line 2?
   a) 10  
   b) 20  
   c) 30  
   d) 40  
   e) None of the above

```cpp
#include<iostream>
using std::cout; using std::endl;
#include<algorithm>
using std::swap;

long* fn1(size_t sz){
   long *p = new long [sz];
   return p;
}

void fn2(long l[], size_t sz){
   size_t indx = 0;
   while(indx < sz){
      *(l+indx) = 10 * indx;
      indx++;
   }
}

long fn3(long *ptr, size_t sz){
   long result = ptr[0];
   size_t indx = 0;
   for(int i=0; i<sz; i++)
      if (ptr[i] > result){
         result = ptr[i];
         indx = i;
      }
   swap(ptr[indx], ptr[0]);
   return result;
}

int main(){
   const size_t sz = 5;
   long *ptr = fn1(sz);
   fn2(ptr, sz);
   cout << ptr[0] << endl; // Line 1
   cout << ptr[4] << endl; // Line 2
   cout << fn3(ptr, sz) << endl; // Line 3
   cout << ptr[0] << endl; // Line 4
   delete [] ptr;
}
```
35) For the program in Figure 6, what output is produced by Line 3?
   a)  10
   b)  20
   c)  30
   d)  40
   e)  None of the above

36) For the program in Figure 6, what output is produced by Line 4?
   a)  10
   b)  20
   c)  30
   d)  40
   e)  None of the above
37) For the program in Figure 7, what output is produced by Line 1?
   a) 100999
   b) 1099
   c) 123
   d) 1099
   e) None of the above

38) For the program in Figure 7, what output is produced on Line 2?
   a) 100999
   b) 1099
   c) 123
   d) 1099
   e) None of the above
39) For the program in Figure 7, what output is produced by Line 3?
   a) 100999
   b) 1099
   c) 123
   d) 1099
   e) None of the above

40) For the program in Figure 7, what output is produced by Line 4?
   a) 100999
   b) 1099
   c) 123
   d) 1099
   e) None of the above