警 示

《中山大学授予学士学位工作细则》第六条

考 试 作 弊 不 授 予 学 士 学 位

计算机科学系　　2012 第一学期

《程序设计 I 》期末考试试题(A)

任课教师：吴维刚　刘聪　刘晓铭　考试形式：闭卷　考试时间：2 小时

年级：12　班别：1、2、3 专业：计算机　　姓名：_____学号：_____成绩_____

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1. Single Choice (20points). Please choose the best answer for each question.

1) Which of the following statements about C++ is correct?
A) C++ is a subset of C.
B) C++ is developed based on Java.
C) Any C++ program can be replaced by a C program with equivalent functionality.
D) C++ is the best programming language.

2) Which of the following is a valid user-defined identifier?
A) _x　B) 9X　C) x#　D) else

3) What is of the following is not a basic flow control structure?
A) Sequence　B) Jump　C) Selection　D) Loop

4) Which of the following math expression is correct?
A) 4x+x　B) (x-4)/2(x-5)　C) ++(2.0/9+x)　D) x+=(x+1)

5) Suppose char x = '9', what is the printout of cout << x+1<<endl ?
A) 0　B) 58　C) 10　D) A

6) Which of the following expression exactly equals to -- i ?
A) i--　B) i+=1　C) ++i　D) i=i-1

7) Suppose *x* is a variable of i*nt*, which of the following is a meaningful boolean expression?
A) 1 < x < 100　B) x = 0　C) x　D) (x = 1) || (x != 1)

8) Which of the following cannot store the string "Good" correctly?
A) char text[] = "Good";　B) char text[] = {'G', 'o', 'o', 'd'}
C) char text[5] = {'G', 'o', 'o', 'd'};　D) char text[] = {'G', 'o', 'o', 'd', '\0'};

9) What is the value of "(double)1/3*3 = = 1"?
A) true　B) false　C) 1　D) maybe true, maybe false

10) Which of the following statements about variable is not correct?

A) A local variable will be automatically initialized to zero if no initial value is given.

B) The address of a variable is the address of the first byte of the variable's memory space.

C) The type of a variable determines the size of memory space used by the variable.

D) It is possible that two variables have the same name.

11) Which of the following is not an advantage of using functions?

A) To hide detailed implementation from the client/caller.

B) To ease code reusing.

C) To make programs easier to read.

D) To make programs run faster.

12) Which of the following statements about function is correct?

A) A function can be defined inside another function.

B) The implementation of a function may appear after the function is called.

C) A value can only be passed from a callee to its caller using a return statement.

D) A default parameter must be the last parameter in any parameter list.

13) To overload a function, you must define functions with different:

A) headers B) names C) return types D) signatures

14) Which of the following about function matching is not correct?

A) A function cannot be matched if it has a different name.

B) A function cannot be matched if it has a different signature.

C) A function cannot be matched if it has no return value.

D) A function cannot be matched if it has not enough number of arguments.

15) Suppose you declare variables as below, which of the following statements is true?

```
int i = 10;
int *pi = &i;
int &ri = i;
```

A) **pi* is 10 B) *&i* is 10

C) *pi* contains the value of *i* D) *i* contains the address of *i*

16) Which of the following statements about array is correct?

A) An array is exactly a pointer to a sequence of variables.

B) The computer will automatically check if each array index is out of bounds in run-time.

C) When an array is used as an argument, only the address of the array will be passed.

D) When an array is used as an argument, its length must be passed as another argument.

17) How to initialize an array of 10 double 0's ?

A) double array[] = {0}; B) double array[10] = {0};

C) double array[] = 0; D) double array[10] = 0;

18) Which of the following statement is not correct?

A) The scope of a local variable is within the function it is defined.

B) The scope of a static variable is within the function it is defined.

C) The lifetime of a local variable is equal to that of the program.

D) The lifetime of a static variable is equal to that of the program.

19) Which of the following statements about recursion is correct?

A) A recursive function must call itself in its function body.

B) An iterative function is easier to be designed than a recursive function with the same functionationality.

C) Recursion runs slower, so it should not be used if the problem can be solved by iteration.

D) Any recursive function can be replaced by an iterative one with the same functionality.

20) In which of the following case can a file be opened to write?

A) The file does not exist.

B) The file is being used by another program for input.

C) The file is being used by another program for output.

D) The file is being used by another program for both input and output.

2. Error correction (20points).

Please find out the errors, including compilation and run-time errors, in the following C++ codes and describe how to correct them.

1) A program to find out the value in an array that is the closest to the average. (5 errors)

```
#include <iostream>
using namespace std;

void fun() {


    for (int i = 0; i < tests; ++ i) {
        int N = 10;
        double data[N];
        double avg = 0;
        for (int j = 1; i < N; ++ j) {
            cin >> data[j];
            avg += data[j];
        }

    int index;
    double min = avg - data[0];
    if (min < 0) min = -min;
    for (int i = 1; i <= N; ++ i) {
        double diff = avg - data[i];
        if (diff < 0) diff = -diff;
        if (min > diff) {
            min = diff;
            index = i;
        }
    }
    return data[index];
}
```

2) A program that replaces a specific character in a string with another one. (5 errors)

```
1 void replace(const char array[length], char from, char to) {
2
3     for (int i = 0; i < length; ++ i) {
4         if (array[0] == from) {
5             array[i] = to;
6         }
7     }
8 }
9
10 int main() {
11     const int length = 9;
12     int array[length] = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9};
13     replace(array, 'a', 'b');
14 }
```

3. Output analysis (20points). Analyze and write down the output for the following programs.

1) A program that handles numbers

```
1 #include <iostream>
2 using namespace std;
3
4 int global  = 1;
5
6 void test(int x) {
7     int local = 1;
8     static static1 = 1;
9     cout << global << " " << local << endl;
10    cout << static1 << " " << x << endl;
11    global += 1;
12    ++ local;
13    static1 = static1 + 1;
14 }
15
16 int main() {
17    int local = 1;
18    while (local < 4) {
19        ++ local;
20        if (local % 2) continue;
21        test(local);
22    }
23 }
```

2) A program that handles strings

```
1 #include <iostream>
2 using namespace std;
3
4 void function1(char *, char *);
5
6 int function2(char * string1) {
7     for (int i = 0; ; ++ i) {
8         if (string1[i] == '\0') return i;
9     }
10 }
11
12 bool compare(char * string1, char * string2, int n) {
13    for (int i = 0; i < n; ++ i) {
14        if (string1[i] != string2[i]) return false;
15    }
```

```
16      return true;
17  }
18
19  int main() {
20      char string1[] = "abcabcabcabc";
21      char string2[] = "bca";
22      function1(string1, string2);
23  }
24
25  void function1(char * string1, char * string2) {
26      int t1 = function2(string1);
27      int t2 = function2(string2);
28      int count = 0;
29      int * location = new int[t1 - t2 + 1];
30      for (int i = 0; i < t1 - t2; ++ i) {
31          if (compare(string1 + i, string2, t2)) {
32              location[count] = i;
33              ++ count;
34          }
35      }
36      for (int i = 0; i < count; ++ i) {
37          cout << location[i] << endl;
38          for (int j = 0; j < location[i]; ++ j)
39              cout << string1[j];
40          for (int j = location[i] + t2; j < t1; ++ j)
41              cout << string1[j];
42          cout << endl;
43      }
44  }
```

4. Fill-in-the-blank (10points).

The following program splits an integer into factors, e.g. 12 = 2 * 2 * 3 . Please fill in the blanks in the follows program to complete them.

```
 1  #include <iostream>
 2  using namespace std;
 3
 4  void getFactors(int number, bool isTheFirstFactor) {
 5      if ( ____________ ) return;
 6      int factor = 2;
 7      while ( ____________ )
 8          ++ factor;
 9      if (isTheFirstFactor)
10          cout << number << " = " << factor;
11      else
12          cout << " * " << factor;
13       ____________ ;
14  }
15
16  void repeatTask(int array[], int size) {
17      for (int i = 0; i < size; ++ i) {
18          getFactors( ____________ );
19          cout << endl;
20      }
21  }
22
23  int main() {
24      int a[] = {12, 8, 2, 6, 7};
25      repeatTask( ____________ );
26  }
```

5. Concept explanation (10points).

Please explain the following concept in details.

1) What is function matching and ambiguous function call?
   Please give a C example of ambiguous function call.

2) What are the relations (in terms of both commonalities and differences) between arrays and pointers (address variables)?
   Please explain in terms of both their types and the operators they can use.
   Please also show a C example for each thing that you explain.

6. Programming Design (20points).

1. Implement the following function that removes all digits in a string:

   void removeDigits(char string[])

   A main function shown in the following that calls this function will have the following output

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     char string[] = "123adfa5d1234fasdf2134";
6     removeDigits(string);
7     cout << string;
8 }
```

   OUTPUT
   adfadfasdf

2. Write a program to get all of the integer solutions of *x* that satisfy the following equations.

$$\begin{cases} x^2 - 20x + 75 = 0 \\ x \,\%\, 5 = 0 \\ 0 < x < n \end{cases}$$

   where, *n* is an integer value input from keyboard.

   OUTPUT(with n =20)
   x = 5
   x = 15