**True or False – (12 Points)**

1. (11 pts) *Circle T for true and F for false:*

   T   F   a) In C++, a function definition **should not be nested** within another function definition.

   T   F   b) Function names have local scope in C++.

   T   F   c) **Value-returning functions** must have the statement `return expression;`

   T   F   d) Arguments corresponding to **value parameters** can be literal values.

   T   F   e) **Reference parameters** receive a copy of an arguments value

   T   F   f) Arguments corresponding to **reference parameters** must be variables

   T   F   g) The names of members in a structure must be unique for that structure

   T   F   h) Members of a structure **must** all be of different DataTypes.

   T   F   i) The expression `name.first` could be used to access the **first** member of the structure variable `name`.

   T   F   j) The **lifetime** of a local variable is for the duration of the program

   T   F   k) Local identifiers have **name precedence** over global identifiers.

   T   F   l) Static variables maintain their value from function call to function call.
Multiple choice (20 points) – Questions 2 – 11

For these problems circle all correct answers.
For example if answers A, C and E are all valid then circle A, C and E.

2. How many function values does a value-returning function have?
   A) 4  B) 2  C) As many as necessary
   D) 1  E) 3  F) None of these

3. A function that does not return a function value is known as what kind of function?
   A) Value returning function  B) Reference Parameter  C) Empty
   D) Void function  E) Expression less  F) None of these

4. Which operations below ARE ALLOWABLE aggregate operations on structures?
   A) Input/Output  B) Arithmetic  C) Return value of a value returning function
   D) Assignment  E) Pass by reference in a function call  F) Comparison

5. Which of the following can be used as a switch expression?
   A) integer variable  B) string variable  C) string constant
   D) floating point variable  E) structure variable  F) None of Them

6. Value parameters (passing by value) are used if a parameters data flow is
   A) One-way, into the function
   B) One-way, out of the function
   C) Two-way, into and out of the function
   D) None of these

7. Reference parameters (passing by reference) are used if a parameters data flow is:
   A) two-way, into and out of the function
   B) one-way, into the function
   C) one-way, out of the function
   D) None of these
8. What are the **reference parameters** in the following **function heading**?

    void DoSomething(string& date, int num, float average, float& sum, string name)

A) **date**  B) **num**  C) **average**  D) **sum**  E) **name**  F) None of them

9. What are the **value parameters** in the following **function heading**?

    void DoSomething(string date, int& num, float& average, float& sum, string name)

A) **date**  B) **num**  C) **average**  D) **sum**  E) **name**  F) None of them

10. The **void** function named **GetNums** has two parameters

    A pass-by-reference parameter named **x** of type **float**
    A pass-by-reference parameter named **num** of type **int**.

Which of the following choices are correct **function prototypes** for the description of the parameters for the function **GetNums**?

A) **void GetNums( float& , int& );**
B) **void GetNums( float& x , int& num );**
C) **void GetNums( float , int num );**
D) **void GetNums(float, int);**
E) **none of the above**

11. The **void** function named **GetNums** has two parameters

    A pass-by-value parameter named **x** of type **float**
    A pass-by-value parameter named **num** of type **int**.

Which of the following choices is a valid **function heading** given the description of the parameters for the function **GetNums**?

A) **void GetNums( float&, int& )**
B) **void GetNums( float& x , int& num )**
C) **void GetNums( float x, int num )**
D) **void GetNums(float, int)**
E) **none of the above**
12. (6 pts) Given the following definitions/declarations.

    const int SIZE = 10;
    int sum;
    float average;
    string name;
    float square(float); // function prototype

consider the following list of expressions to be considered for arguments in some function call:

a) sum
b) square(average)
   c) 'B'
   d) “Word”
e) average
f) SIZE*10
g) name
h) average*float(sum)

A) List all expressions above that are valid for use as arguments with reference parameters?

B) List all expressions above that are valid for use as arguments with value parameters?

13. (6 pts) There are two functions shown in the code segment below. Assume all variables and function prototypes have been correctly declared before this segment of code.

    WriteInfo(outFile, count);
    status = Average(sum, num);

A) Which function(s) is(are) most likely value-returning function(s)?

B) Which function(s) is(are) most likely void function(s)?

C) What are the arguments that are used in the two function calls?
14. (6 pts) Rewrite the value returning function definition below as a void function definition such that the caller of the function still has access to the result that is being returned by the value returning function. Be sure to change the function return type and to add a parameter in the void function.

```cpp
string FindSub()
{
    string sub, line;
    cout << "Enter a line: ";
    getline(cin, line);
    sub = line.substr(line.size()/2, line.size());
    return sub;
}
```

15. (4 pts) Consider the following function definition:

```cpp
int Square(int& x)
{
    x = x * x;
    return;
}
```

Assuming an appropriate prototype has been included previously, will the function Square above compile correctly? (circle yes or no)

Yes  No

If your answer was no, explain why it will not compile.
16. (6 pts) Consider the following structure declaration when answering the questions below.

```c++
struct House {
    string builder;
    string style;
    int year;
    int stories;
};
```

a) Write a statement that declares the identifier `condo` as a variable of DataType `House`.

b) Write a `cout` statement that will output the value of the `style` member of the variable `condo`.

c) Write a `cout` statement that will output the value of the `builder` member of the variable `condo`.

d) Write a statement that assigns a value of “Ranch” to the `style` member of `condo`.

17. (6 pts) Write a structure declaration for a structure named `Zoo` with the following members:
- an integer variable representing the number of animals
- a string variable representing the name of the zoo
- a string variable representing the city where the zoo is located
- a floating-point variable indicating the cost of admission
18. (8 pts) For the questions A through D, consider the following program. Note just the lines of importance have been displayed here. There is at least one answer for each question, and some may have more than one answer. Provide ALL the answers to a question. As an example, if the question is “what line contains a return statement?” The answer is line 12, 14, 16 and line 18.

```cpp
#include <iostream>         // Line 1
using namespace std;         // Line 2
int function_1(int&, float, int);       // Line 3
void function_2(float&, int, float&);      // Line 4
void function_3(float&, int);        // Line 5
int main()           // Line 6
{
    int sum1, num, enter;        // Line 7
    float temp, avg;         // Line 8
    function_3(temp, num);        // Line 9
    function_2(avg,num,temp);       // Line 10
    function_2(avg,function_1(sum1,avg,num),temp);   // Line 11
    return 0;          // Line 12
}
int function_1(int& sum, float number, int enter)   // Line 13
{
    return enter;          // Line 14
}
void function_2(float& average, int count, float& number)  // Line 15
{
    return;           // Line 16
}
void function_3(float& value, int number)         // Line 17
{
    return;           // Line 18
}
```

A) Which of the lines indicated are function prototypes? ______________________________

B) Which of the lines indicated include function calls? ______________________________

C) What are the arguments used in the function call for function_1?

___________________________________________________________________________

D) What are the arguments used in the function call for function_3?

___________________________________________________________________________
19. (8 pts) Finish the program below by adding a void function as specified below. Add only a function prototype, function call statement and function definition to the following program. Do not add any variable declarations.

The name of the void function is `InitStruct`. The function has one parameter of the struct `DataType Date`. The function is to initialize the structure parameter with a date of January 1, 2000. The information stored in the parameter must be available in main() after the function call.

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

struct Date
{
    string month;
    int day;
    int year;
};
// Place the function prototype below this line

int main()
{
    Date appt;  // appt is a structure variable of data type Date
    // Place the function call statement below this line
    return 0;
}
// Place the function definition below this line
```
20. (8 pts) For the following code segment, write out what is printed to the screen. Show the displayed output precisely by using the following rules:
   o Write one character per box.
   o Skip a box to indicate the presence of a blank space in the output.
   o Skip a row to indicate the presence of a blank line in the output.

```cpp
#include <iostream>
using namespace std;
void Test(int);
int main()
{
    Test(4);
    Test(3);
    Test(2);
    Test(1);
    return 0;
}
void Test(int value)
{
    static int i = 5;
    static int j = 0;

    cout << i << "-" << j << endl;
    i--;
    j = j + value;
}```
21. (10 pts) Write a **void function** that is described below:

- The name of the void function is **OpenInput**.
- The function has one parameter – an input file stream.
- The function is to:
  a) Prompt the user for the name of an input file and read it.
  b) Open the file.
  c) If the file did not open successfully, print out a message stating as such, reset the input stream variable (code to do this is inFile.clear();)
  d) Repeat steps a,b,c until a file is successfully opened or the user enters ctrl-c.
Extra Credit (5 pts)
For this problem show precisely the displayed output
- Write one character per box.
- Skip a box to indicate the presence of a blank space in the output.
- Skip a row to indicate the presence of a blank line in the output.

The following program is executed. What is the output to the screen?

```cpp
#include <iostream>
using namespace std;
void Sum(int , int& );
int main()
{
    int num =5, sum= -1 ;
    Sum(num,sum);
    cout << "Num: " << num << " sum: " << sum << endl;
    return 0;
}
void Sum(int n, int& sum)
{
    do
    {
        sum=sum+n;
        cout << "sum: " << sum << endl;
        n=n-1;
    } while(n>=1);
}
```