Exam I Instructions – Time Limit 60 Minutes

Turn in all exam papers and the bubble sheet

General Instructions:

- Neatness counts!! If the machine cannot read your answer, you will receive no credit.
- This is a closed book/closed notes exam.
- No reference materials of any kind will be permitted.
- No calculators or other portable computing/data storage devices are permitted.
- Any C++ code segments that you write must be syntactically correct or you will lose points.

There are two parts to this exam:

Part I (50 pts) - Bubble Sheet – True/False, Multiple Choice, Vocabulary, fill in the blank
Part II (50 pts) - Written part – Short answers, writing code segments, algorithms and Functional Decompositions

Bubble Sheet Instructions: (Part I)

1) Use a #2 pencil to complete the bubble sheet!

2) Print your name in the Name box as follows:

   LASTNAME  FIRSTNAME  MIDDLEINITIAL

   Example:   Bowman  Ron  D

3) Use your #2 pencil to fill in the corresponding bubbles under each character of your name.
   (Bubble marking instructions are included on Side 2 of the bubble sheet.)

4) In the identification number area, put in your a number without the A and bubble in the
   corresponding bubbles under each number

5) Record your answers to the questions in Part I on Side 1 of the bubble sheet. Neatness Counts!!

   Warnings:

   - For Part I, answers not recorded on the bubble sheet will receive no credit!!
   - Be wary of skipping problems!!
   - I recommend that you answer each question in Part I in the order presented.
   - Read all possible answers. Some questions have answers like “a and b” or “all of the above”

Instructions for Part II – Short answers

1) Write your answers as neatly as possible in the space provided.
2) In some cases it is best to think for a minute and then start writing.
Exam I – Part I (50 pts): Multiple Choice
(Select the best answer for each problem and record it on the bubble sheet)

1. True or False? There is only one unique general solution (algorithm) for a given problem.
   A) True  B) False

2. True or False? The function `main()` is required for every C++ program.
   A) True  B) False

3. True or False? `string` variables cannot hold values of a single character.
   A) True  B) False

4. True or False? Conversion of a number from a float to an `int` usually results in a loss of information.
   A) True  B) False

5. True or False? `char` variables can hold the value of more than one character.
   A) True  B) False

6. True or False? Type coercion is the implicit conversion of one data type to another.
   A) True  B) False

7. True or False? A `void` function can be invoked (called) within an expression.
   A) True  B) False

8. Which of the following statements about the C++ `main` function is false?
   A) Every program must have a function called `main`
   B) Program execution begins with the first executable statement in the `main` function.
   C) The `main` function must call (invoke) at least one other function.
   D) The word `int` in the function heading means that the `main` function returns an integer value (to the operating system).

9. Which one of the following is not a valid identifier in C++?
   A) `my_Name`  B) `myName`  C) `_myName`  D) `my2Name`  E) All are valid

10. Determination of an algorithm takes place during the ________________ phase of a computer program's life cycle.
    A) Implementation  B) Problem-Solving  C) Maintenance  D) Full Moon
    E) None of the above
11. ________________ is the formal rules governing how valid instructions are written in a programming language.
   A) Semantics  B) Metalanguage  C) Preprocessing  D) Syntax  E) C++

12. ________________ are the set of rules that determines the meaning of instructions written in a programming language.
   A) Semantics  B) Metalanguage  C) Preprocessing  D) Syntax  E) C++

13. A ________________ is a specific set of data values, along with a set of operations on those values.

   A) Reserved word  B) Variable  C) Data Type
   D) Expression  E) Identifier

14. A ________________ is a word that has special meaning in C++; it cannot be used as a programmer defined identifier.

   A) Reserved word  B) Variable  C) Data Type
   D) Expression  E) Identifier

15. An ________________ is a statement that stores the value of an expression into a variable.

   A) Literal Value  B) Assignment Statement  C) Evaluate
   D) Expression  E) Function

16. A(n) ________________ is any constant value written in a program.

   A) Literal Value  B) Assignment Statement  C) Evaluate
   D) Expression  E) Function

17. A(n) ________________ is an arrangement of identifiers, literals, and operators that can be evaluated to compute a value of a given type.

   A) Literal Value  B) Assignment Statement  C) Evaluate
   D) Expression  E) Function

18. ________________ is the explicit conversion of a value from one data type to another.

   A) Type Conversion  B) Type Casting  C) Type Coercion
   D) A and B  E) A and C
19. After the following code segment executes, what will \( x \) contain after execution of the following statement:

\[
\begin{align*}
\text{float } x; \\
\text{int num } &= 23; \\
x &= \text{num} / 4 + 5.0;
\end{align*}
\]

A) Nothing; a compile-time error occurs  
B) 3.0  
C) 4.0  
D) 8.0  
E) 10.0

20. If the \texttt{int} variables \texttt{int1} and \texttt{int2} contain the values 9 and 10, respectively, then the value of the expression \texttt{float(int1 / int2)} is:

A) 1.0  
B) 0.9  
C) 0.0  
D) 9.0  
E) 10.0

21. Given a variable \( n \) of type \texttt{int} with an initial value of 5, which of the following statements will result in the value 4 being stored into \( n \)?

A) \( n = n + 1; \)  
B) \( ++n; \)  
C) \( n++; \)  
D) \( n = 4; \)  
E) All of the above

22. Which output manipulator is used to terminate output on the current line?

A) \texttt{endl}  
B) \texttt{showpoint}  
C) \texttt{setprecision}  
D) \texttt{fixed}  
E) None of the above

23. Which output manipulator is used to control the number of digits printed to the right of the decimal point?

A) \texttt{endl}  
B) \texttt{showpoint}  
C) \texttt{setprecision}  
D) \texttt{fixed}  
E) None of the above

24. Which output manipulator is used to control the number of positions the next data item should occupy when printed?

A) \texttt{endl}  
B) \texttt{showpoint}  
C) \texttt{setprecision}  
D) \texttt{fixed}  
E) None of the above
25. What is the output of the following program fragment listed below? (a indicates a space)

```cpp
string str1, str2;
str1 = "This a sample string";
str2 = "sample";
cout << str1.find(" s");
```

A) 5 B) 6 C) 7 D) 0 E) string::npos

26. What is the output of the following program fragment listed below? (a indicates a space)

```cpp
string str1, str2;
str1 = "This a sample string";
str2 = "sample";
cout << str1.find("this");
```

A) 5 B) 6 C) 7 D) 0 E) string::npos

27. What is the output of the following program fragment listed below? (a indicates a space)

```cpp
string str1, str2;
str1 = "This a sample string";
str2 = "sample";
cout << str2.size();
```

A) 5 B) 6 C) 7 D) 0 E) string::npos

28. What is the output of the following program fragment listed below? (a indicates a space)

```cpp
string str1, str2, str3;
str1 = "This a sample string";
str2 = "sample";
str3 = str1.substr(5,3);
cout << str3;
```

A) is a B) a sa C) a sam D) s a s E) None of These

29. What is the output of the following program fragment listed below? (a indicates a space)

```cpp
string str1, str2, str3;
str1 = "This a sample string";
str2 = "sample";
str3 = str1.substr(str1.find("sam"),8);
cout << str3;
```

A) sample s B) sample C) sample string D) A and C E) None of the above
// This program prompts the user for a year, reads in the value entered
// and prints out if the year entered is a leap year or not.
//**************************************************************************

```cpp
#include <iostream>   // Access output stream

bool IsLeapYear( int ); //value-return function Prototype for sub-algorithm

int main()
{
    int year;    // year value input by the user

    // Prompt the user for input
    "Enter a year AD, for example, 1997:" << endl;
    cin >> year;     // Read year entered by the user

    if (IsLeapYear(year)) // Test for leap year
        cout << year << " is a leap year." << endl;
    else
        cout << year << " is not a leap year." << endl;

    // Done!! Exit from the program
}

bool IsLeapYear( int year )
// IsLeapYear returns true if year is a leap year and
// false otherwise.
{
    if (year % 4 != 0) // Is year not divisible by 4?
        return false;  // If so, can't be a leap year
    else if (year % 100 != 0) // Is year not a multiple of 100?
        return true;   // If so, is a leap year
    else if (year % 400 != 0) // Is year not a multiple of 400?
        return false;  // If so, then is not a leap year
    else
        return true;  // Is a leap year
}
```
30. Possible Answers:  

```cpp
#include <iostream>  // Access output stream
```

A) include  B) process  C) #include  D) #process  E) None of these

31. Possible Answers:  

```cpp
;  // Global using directive
```

A) using  B) namespace  C) namespace std  D) using std namespace  

E) None of the above

32. Possible Answers:  

```cpp
main()
```

A) float  B) string  C) int  D) char  E) None of these

33. Possible Answers:

```cpp
"Enter a year AD, for example, 1997:" << endl;
```

A) cout  B) input  C) getline  D) cin  E) None of the above

34. Possible Answers:

```cpp
"Enter a year AD, for example, 1997:" << endl;
```

A) >=  B) >>  C) ==  D) <<  E) None of the above

35. Possible Answers:  

```cpp
// Done!! Exit from the program
```

A) return;  B) return 0  C) return 0;  D) return  E) None of the above
Exam I – Part II (50 pts): Short Answers

(Write your answers in the space provided)

1) (3 pts) Identifiers can consist of what types of characters (three distinct answers)?

2) (3 pts) An expression is an arrangement of ________________, ________________ and ________________ that can be evaluated to compute a value of a given type.

3) (2 pts) What are two methods used to indicate comments in a C++ program?

4) (6 pts) Assignment and declaration statements
   a) Provide a constant declaration for an int identifier of LEGAL_AGE.
   b) Provide a constant declaration for a string identifier of STREET.
   c) Provide an int variable declaration for the identifier Number.
   d) Provide a double variable declaration for the identifier pi.
   e) Write a statement to assign a null string to the string variable Str1.
   f) Write a statement to assign the value 1.75 to the float variable Average.
5) (6 pts) Evaluate the expressions shown given the following declarations. If the answer is a floating-point value, be sure to indicate as such by using a decimal point in the answer. Remember that evaluation proceeds from left to right following an order of precedence for the operations.

```cpp
int a = 4, b = 2, c = 4, d = 8;
float x = 4.0, z = 14.0;
```

A) \[(3\times 4)/a + 8/x\] 

B) \[ (d+1) – (d+1)/b \times b \]

C) \[ z/x + b \]

---

6) (4 pts) Show the output of each statement below. Place a single character in each box, Skip a box to indicate a space.

a) `cout << setw(7) << "Hello" << setw(7) << left << "World";`

```
   H      L
   o      o
   l      l
   l      l
   l      l
   l      l
   e      e
```

b) `cout << "Number:" << right << setw(8) << "One";`

```
N       O
u       n
r       e
```

---

7) (6 pts) Show PRECISELY the output of the following statements. Place a single character in each box, skip a box to indicate a space, and skip a row to indicate a blank line. In the code, a \[\] indicates a space.

```
cout << “What” << setw(6) << left << “is”;
cout << “the\nlast\nline” << endl;
cout << setw(8) << “Not\n” << endl;
cout << “” << “this\none” << endl;
```
8) (10 pts) Write an algorithm that solves the problem described.

**Problem:** Write an algorithm for making lemonade. The following assumptions can be made.

a) All items except water are in the same cabinet.

b) A pre-measured package of lemonade mix is to be used.

c) You are only making the lemonade.

d) No ice is required.

e) The lemonade must be mixed with a spoon.

f) Remember all steps should have a finite quantity/time.

g) Some of the steps in your algorithm may be abstract. Those steps would require a sub-algorithm (which does not have to be written for this exam).
9) (10 pts) Write a functional decomposition that provides a solution for the problem described.

**Problem:** A program is to be written that will convert Celsius degrees to Fahrenheit degrees. The program will prompt the user for a Celsius temperature and then convert it to Fahrenheit. The program will then output information regarding the Celsius temperature entered and the Fahrenheit temperature calculated.

**Note:** this problem is relatively short and easy. However, two sub-modules should be used for this functional decomposition. There are 3 parts to the top-level module, and one of these parts is a concrete step. The other two steps are to be considered abstract.

Formula: \( \text{degreesFahrenheit} = \left( \frac{9.0}{5.0} \right) \times \text{degreesCelsius} + 32 \)