Exam I Instructions – Time Limit 65 Minutes

\( \Rightarrow \) Turn in all exam papers and the bubble sheet \( \Leftarrow \)

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 (100 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 you’re A number (LEFT JUSTIFIED) 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 (100 pts): Multiple Choice
(Select the best answer for each problem and record it on the bubble sheet)

**Definition Matching**

Match the words with their definitions. Choose the **best definition** for each word.

1. Semantics ______
2. Syntax ______
3. named constant _____
4. Software Piracy _____
5. Identifier ____
6. Expression ____
7. Data Type ____
8. Function Call ____
9. Declaration ____

A) Definition is not listed below (This answer can be used more than once if necessary)

B) The formal rules governing how valid instructions are written in a programming language.
C) A specific set of values along with a set of operations on those values.
D) The unauthorized copying of software for either personal use or use by others
E) A statement that associates an identifier with a data object, a function or a data type.

AB) A Name associated with a function or data object and used to refer to that function or data object.
AC) Arrangement of identifiers, literals and operators that can be evaluated to compute a value.
AD) A location in memory, referenced by an identifier, that contains a data value that can be changed.
AE) A location in memory, referenced by an identifier, that contains a data value that cannot be changed.

BC) The set of rules that determines the meaning of instructions written in a programming language.
BD) The implicit conversion of a value from one data type to another.
BE) A function that does not return a function value to its caller
CD) A function that returns a single function value to its caller
CE) Computes a new value by performing a specified set of operations on given values.
DE) The mechanism that transfers control to a function.
True or False, Use an answer of \textbf{A for True} and an answer of \textbf{B for False}

\begin{enumerate}
\item The C++ compiler finds all semantic errors? \textbf{B}
\item The function \texttt{main()} is required for every C++ program. \textbf{A}
\item \textbf{String} variables cannot hold values of a single character. \textbf{B}
\item The getline function reads in a single character without skipping any leading white spaces? \textbf{B}
\item \texttt{Char} variables can hold the value of more than one character. \textbf{B}
\item Type coercion is the implicit conversion of one data type to another. \textbf{A}
\item A semi-colon terminates a block statement? \textbf{A}
\item Relational expressions are made up of expressions and relational operators. \textbf{A}
\item \texttt{The statement cin.ignore(100,'A'); skips characters until an 'A' is encountered?} \textbf{B}
\end{enumerate}

\begin{center}
\textbf{Multiple choice}
\end{center}

\textit{For these problems bubble in all correct answers. For example if answers A, C and E are all valid then bubble in A, C and E on the answer sheet.}

\begin{enumerate}
\item Which of the following statements about the C++ \texttt{main()} function is true?
\begin{enumerate}
\item \texttt{Main()} is an optional function for all programs \textbf{E}
\item Program execution begins with the first executable statement in the \texttt{main()} function. \textbf{A}
\item The \texttt{main()} function must call (invoke) at least one other function. \textbf{A}
\item The word \texttt{int} in the function heading means that the \texttt{main()} function works only for integer variables. \textbf{E}
\item All of the above are false statements \textbf{E}
\end{enumerate}
\item Which one of the following is not a valid identifier in C++?
\begin{enumerate}
\item \texttt{my_Name} \textbf{E}
\item \texttt{myName} \textbf{E}
\item \texttt{_myName} \textbf{E}
\item \texttt{my2Name} \textbf{E}
\item All are valid \textbf{B}
\end{enumerate}
\item Which one of the following is not a valid identifier in C++?
\begin{enumerate}
\item \texttt{twoBe} \textbf{E}
\item \texttt{OrNot} \textbf{E}
\item \texttt{2be} \textbf{E}
\item \texttt{_or_not} \textbf{E}
\item All are valid \textbf{D}
\end{enumerate}
\item Coding of the algorithms into a source code program takes place during the \underline{\text{\hspace{1cm}}} phase of a computer program’s life cycle.
\begin{enumerate}
\item Implementation \textbf{E}
\item Problem-Solving \textbf{E}
\item Maintenance \textbf{E}
\item Full Moon \textbf{E}
\item None of the above \textbf{E}
\end{enumerate}
23. After the following code segment executes, what value is stored in the variable **value**?

```c
float value;
int num = 9;
value = num / 4 + 2.5;
```

A) Nothing; a compile-time error occurs  
B) 3.75  
C) 4.0  
D) 4.75  
E) 4.5  

24. How many characters can be stored in a variable of DataType **char**?

A) 0  
B) 1  
C) 2  
D) 3  
E) As many as necessary  

25. Given a variable **n** of type **int** with an initial value of 4, which of the following C++ statements results in the value 3 being stored into **n**?

A) n = 3;  
B) --n;  
C) n++;  
D) n = n - 1;  
E) n--;  

26. What is the name of the header file required for using file input/output?

A) iostream  
B) string  
C) cmath  
D) iomanip  
E) fstream  

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

A) endl  
B) showpoint  
C) setprecision  
D) fixed  
E) None of the above  

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

A) endl  
B) showpoint  
C) setprecision  
D) fixed  
E) None of the above  

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

A) endl  
B) showpoint  
C) setprecision  
D) fixed  
E) None of the above
30. The following C++ statements are to be included in a program. What is the correct data type needed for the variable len? (only one possible answer for this question)

```cpp
string firstName;
????? len;
len = firstName.size();
```

A) float   B) string::npos   C) string   D) double

E) None of these

For questions 31-34, consider the following C++ declarations. In the code, a indicates a space

```cpp
string str1 = "What day is today";
string str2 = "Next Line";
string str3;
string::size_type Length, Position;
```

For the above declarations, answer the questions based on the program fragment shown.

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

```cpp
Length = str2.length(); cout << Length;
```

A) 7   B) 8   C) 9   D) 0   E) string::npos

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

```cpp
Position = str1.find("is"); cout << Position;
```

A) 10   B) 9   C) 8   D) 7   E) string::npos

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

```cpp
Position = str2.find("l"); cout << Position;
```

A) 4   B) 5   C) 6   D) 7   E) string::npos

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

```cpp
str3 = str1.substr(str1.find("d"),4); cout << str3;
```

A) ay i   B) day   C) oday   D) day

E) None of the above
Complete the following program using the possible answers listed on the next 2 pages. Sample Input and Output for the program is shown on the next page.

// Program Description:
// This program reads in a line from a text file and determines if a ":" is present in the line. It then prints out the line and the position of the ":" in the string. The program then skips the next line in the input file, reads the third line and prints the third line out to the screen

#include <iostream>   // Header file for cout and endl
#include <35>   // string operations
#include <36>   // file stream operations
using 37;    // Global using directive

int main()
{

    inFile;   // input file stream variable
    filename;   // name of the input file
    string line;   // holds the line read in from the file
    string::size_type position; // holds position of the :

    cout << "Name of input file: "; // Prompt for input file name
    cin >> filename;   // Read the input file name
    inFile.open(filename);  // Open the input file
    // Read in the first line from the file
    position = 43 // find the position of the :
    // output the first line read from the file
    cout << "First line: " << line << "- position: " << position << endl;
    // Skip the next line in the file
    // maximum number of characters on the line is 70 ➤
    44 // skip the second line in the file
    // This 42 and the 42 above are the exact same C++ statement
    42  // Read in the third line from the file
    cout << "Third line: " << line << endl;

    45 // Program successful

} // End of main()
Sample Input:  Line1 has a: in it
Line 2 is skipped
Line 3 is read.

Sample Output:  Name of input file: Input.txt
First line: Line1 has a: in it- position: 11
Third line: Line 3 is read.

35. Possible Answers:  #include <________>  //string operations
A) fstream     B) string     C) iomanip     D) ifstream     E) None of the above

36. Possible Answers:  #include <________>  //file stream operations
A) fstream     B) string     C) iomanip     D) ifstream     E) None of the above

37. Possible Answers:  using ______;  // Global using directive
A) std     B) namespace     C) namespace std     D) std namespace
E) None of the above

38. Possible Answers:  ______ inFile;  // input file stream variable
A) fstream     B) string     C) iomanip     D) ifstream     E) None of the above

39. Possible Answers:  ______ filename;  // name of the input file
A) char     B) int     C) float     D) string     E) None of the above

40. Possible Answers:  ______.open(____);  // Open the input file
A) filename     B) filename.c_str()     C) c_str().filename     D) inFile
E) None of the above
41. Possible Answers: 
   40. open(41); // Open the input file
      A) filename   B) filename.c_str()   C) c_str().filename   D) inFile
      E) None of the above

42. Possible Answers: 
   42. // Read in the first line from the file
      A) inFile.getline(line);   B) getline(line,inFile);   C) getline (inFile, line);
      D) inFile.get(line);   E) None of the above

43. Possible Answers: 
   position = 43 // find the position of the :
      A) line.find(‘:’);   B) find(line,”.”);   C) inFile.find(‘:’);
      D) find.line(‘.’);   E) None of the above

44. Possible Answers: 
   44. // skip the second line in the file
      A) inFile.ignore(40,’\n’);   B) ignore(75,”\n”);   C) inFile.ignore(“\n”,75);
      D) inFile.ignore(75,’\n’);   E) ignore.inFile(40,’\n’);

45. Possible Answers: 
   45. // Program successful
      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) (3pts) Identifiers can consist of what types of characters (three distinct answers)?

2) (3pts) 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 a string identifier of MONTH.
   b) Provide a constant declaration for a float identifier of AGE.
   c) Provide a bool variable declaration for the identifier dataOK.
   d) Provide a double variable declaration for the identifier average.
   e) Write a statement to assign a null string to the string variable str1.
   f) Write a statement to assign the value 100.75 to the float variable sum.
5) (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) << left << "Hello" << setw(7) << right << "World";`

```
H e l l o                        W o r l d
```

b) `cout << setw(8) << "Number" << right << setw(3) << "please";`

```
N u m b e r         p l e a s e
```

6) (4 pts) For the code segments shown, add ONE LINE OF code to open an input file, named `input.txt`, in the manner specified.

a) For this code segment use the literal value, `input.txt`, for opening the file
   `ifstream inData;`  
   // place open statement using a literal value below this line

b) For this code segment the file name is stored in a string variable, and the string variable is used for opening the input file.
   `ifstream inData;`  
   `string filename = "input.txt";`  
   // place open statement using a string variable below this line

7) (4 pts) Your program has three char variables `ch1`, `ch2` and `ch3`. Given the characters present in the standard input stream(`cin`) shown below, write the statements using the `get` function so that the ‘A’ is read into `ch1`, the ‘B’ is read into `ch2` and the ‘C’ is read into `ch3`. Note that there is one space between each character in the input stream, and the reading marker is currently on the ‘A’. A

Input stream:  A B C

\n
8) (8 pts) In the following program, fill in all missing information in the areas provided so that the program performs the following:

a) Opens the input file *in.txt* for reading using the input file stream variable *inData*.

b) Opens the output file *out.txt* for writing using the output file stream variable *outData*.

c) Reads a word from the first line of *in.txt*, and writes this word to the output file *out.txt*.

d) Reads the second line of *in.txt* and writes it to the second line of the output file *out.txt*.

**Note**) Think about how the reading from the input file is performed. Make sure the output file consists of two lines (not one).

```cpp
#include <iostream>

#include "first_line"

#include "this is second line"

using _______________

int main()
{
    string _______________

    ifstream _______________

    inData.open_____________________

    return 0;
} // end of main
```
9) **(8 pts)** Write an algorithm that solves the problem described.

**Problem:** Write an algorithm for grilling hamburgers. The following assumptions can be made.

a) All necessary utensils are available at the grill
b) The hamburgers are made and available at the grill
c) The grill is off and must be lit.
d) Grilling surface needs to be brushed clean before cooking the hamburgers.
e) The grill is to be turned off at the end.
10) (8 pts) Write a functional decomposition that provides a solution for the following problem.

**Problem:** A program is to be written to perform the following tasks:

- Prompt the user for the name of an input file and the name of an output file.
- The files are to be opened and used by the program.
- The input file contains five integer numbers that are to be read.
- The sum of these numbers and the average are to be calculated.
- Output is written to the output file and consists of writing all five numbers, the average of the numbers and the sum of the numbers.
- All values are to be written with proper identifying phrases.

**Note:** There needs to be at least two sub-modules in your solution.