Closed notes and book. If you have any questions ask them. Write clearly and make sure the case of a letter is clear (where applicable) since C++ is case sensitive. There are no syntax errors on this exam. If you find one let me know.

You can assume that there is one space between words unless otherwise noted. If necessary, the symbol indicates a space, and it is used when two or more spaces are together.

For this test the two-character sequence \n is to be taken to mean the newline character.

**Definition Matching – (10 Points)**

1. **(10 pts)** Match the words with their definitions. Choose the best definition for each word.

   Identifier _____
   
   Syntax _____
   
   Literal Value _____
   
   Data Type _____
   
   Named Constant _____
   
   Declaration _____
   
   Algorithm _____
   
   Semantics _____
   
   Type Cast _____
   
   Reading Marker _____

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

B) The explicit conversion of a value from one data type to another.

C) The mechanism that transfers control to a function

D) A program that translates a high-level language into machine code.

E) The implicit conversion of a value from one data type to another

F) A specific set of values along with a set of operations on those values

G) A Name associated with a function or data object and used to refer to that function or data object.

H) A location in memory, referenced by an identifier, which contains a data value that cannot be changed.

I) A location in memory, referenced by an identifier, which contains a data value that can be changed

J) The set of rules that determines the meaning of instructions written in a programming language.

K) Any constant value written in a program.


M) The formal rules governing how valid instructions are written in a programming language.

N) Indicates the next character waiting to read from the input stream

O) A statement that associates an identifier with a data object, a function or a data type
True or False – (12 Points)

2. (12 pts) Circle T for true and F for false:

T  F  a) The C++ compiler finds syntax errors in a program?

T  F  b) The function main() is required for every C++ program.

T  F  c) Type coercion is the implicit conversion of one data type to another.

T  F  d) A C++ program is written in code during the implementation phase of a program’s life.

T  F  e) A void function can be invoked (called) within an expression.

T  F  f) Algorithms are a step-by-step procedure for solving a problem in a finite amount of time.

T  F  g) The size() function returns the number of characters contained in a string variable.

T  F  h) The find() function returns string::npos if it successfully finds its argument.

T  F  i) The get() function obtains the next non-white space character from the input stream.

T  F  j) The extraction operator (>>) terminates on trailing whitespace characters only.

T  F  k) The statement cout << num++; gives the same output as cout << ++num;

T  F  l) The ignore function is used to skip characters on the input stream.

Multiple choice (24 points) – Questions 3 – 26

For these problems circle all correct answers.

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

3. In this class, which of the following are invalid identifiers in C++?

A) A--B  B) %456  C) twoBits  D) House_  E) All

4. In this class, which of the following are valid identifiers in C++?

A) 2z3  B) m_2_C_A_R  C) four_ten  D) _Name  E) All
5. Which output manipulator is used to terminate output on the current line?
   
   A) setw       B) showdecimal       C) showpoint       D) endl
   
   E) None of the above

6. What is the name of the header file required for using setw and setprecision?
   
   A) iostream       B) manip       C) iomanip       D) string       E) cmath

7. Which output manipulator ensures a decimal point is output for all floating-point numbers?
   
   A) setw       B) showdecimal       C) showpoint       D) endl
   
   E) None of the above

8. Which output manipulator can be used to specify the output justification used with setw?
   
   A) setw       B) center       C) showpoint       D) endl
   
   E) None of the above

9. Which output manipulator specifies how many character positions the next data item should occupy when it is output?
   
   A) setw       B) center       C) showpoint       D) endl
   
   E) None of the above

10. After the following code segment executes, what value is stored in the variable result?:

```
    float result;
    int num = 4;
    result = int(5/num + 1.5);
```

   A) 2       B) 1       C) 2.75       D) 2.5       E) a runtime error       F) None of These

11. The following C++ statements are to be included in a program. What is the best correct data type needed for the variable mystery? (only one possible answer for this question)

```
    ????? mystery;
    getline(cin, str1, mystery);
```

   A) float       B) string       C) int       D) char
   
   E) None of these
For questions 12-14, consider the following C++ declarations. In the code, a □ indicates a space

```cpp
string str1 = "This□Class□is□CPE112";
string str2 = "CPE112□is□easy";
string str3 = "Length□is";
string::size_type num, Position;
```

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

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

```cpp
num = str2.size(); cout << num;
```

A) 12    B) 13    C) 14    D) 15    E) string::npos

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

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

A) 0    B) 1    C) 5    D) 6    E) string::npos

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

```cpp
str3 = str2.substr(6,5); cout << str3;
```

A) 2□is□    B) □is□e    C) 12□is□    D) 2□is□e    E) None of the above

15. C++ is an example of a(n)

A) Meta Language    B) Foreign Language    C) Assembly Language

D) Low Level Language    E) Machine language    F) None of These

16. A(n) ____________________ is a function that returns a function value to its caller and is invoked within an expression.

A) Main Function    B) Value-returning function    C) Void Function

D) Subprogram    E) None of These
17. The following C++ statements are to be included in a program. What is the best possible data type needed for the variable `len`? (only one possible answer for this question)

```cpp
string firstName="Reginald";
?????? len;
len = firstName.find("Hello");
```

A) `string::npos`  B) `string::size_type`  C) `string`  D) `char`  E) None of these

18. Given the constant declaration and integer variable declaration

```cpp
const int FACTOR = 95;
int num = 5;
```

which of the following is a valid use of `FACTOR`?

A) `cin >> FACTOR;`  B) `cout << FACTOR * 3;`  C) `FACTOR = 24;`  D) `num = num*FACTOR`  E) None of the above are valid

19. Given the following series of C++ statements, what value is stored in the variable `ch3` assuming that the user inputs the text highlighted in gray? (indicates a space)

```cpp
A  B  
C D 
`char ch1;`  
`char ch2;`  
`char ch3;`  
`cin >> ch1;`  
`cin >> ch2;`  
`cin >> ch3;`
```

A) ‘A’  B) ‘□’  C) ‘\n’  D) ‘C’  E) None of the above

20. Given the following series of C++ statements, what value is stored in the variable `ch3` assuming that the user inputs the text highlighted in gray? (indicates a space) Reading marker is on A

```cpp
A  
C B D 
`char ch1;`  
`char ch2;`  
`char ch3;`  
`cin.get(ch1);`  
`cin.get(ch2);`  
`cin.get(ch3);`
```

A) ‘A’  B) ‘□’  C) ‘\n’  D) ‘C’  E) None of the above
21. Given the following series of C++ statements, what value is stored in the variable \texttt{ch} assuming that the user inputs the text highlighted in gray? \textit{Reading marker is on the first A.}

\begin{verbatim}
ABCDEF\nFEDCBA\nchar ch;
cin.ignore(10,\’\n\’);
cin.get(ch);
\end{verbatim}

A) ‘E’
B) ‘D’
C) ‘C’
D) ‘F’
E) None of the above

22. Given the following series of C++ statements, what value is stored in the variable \texttt{string2} assuming that the user inputs the text highlighted in gray? (\(\text{"\ indicates a space}\). The reading marker is on F

\begin{verbatim}
February\ 29,\ 1996\nstring string1;
string string2;
cin >> string1;
getline(cin,string2,\’\n\’);
\end{verbatim}

A) “February\ 29,\ 1996”
B) “29,\ 1996”
C) “February”
D) “29,\ 1996\n”
E) None of the above

23. Given the following series of C++ statements, what value is stored in the variable \texttt{string1} assuming that the user inputs the text highlighted in gray? (\(\text{"\ indicates a space}\). The reading marker is on F

\begin{verbatim}
February\ 29,\ 1996\nstring string1;
cin.ignore(3,\’\n\’);
getline(cin,string1,\’\n\’);
\end{verbatim}

A) “ruary\ 29,\ 1996\n”
B) “ruary\ 29,\ 1996”
C) “February”
D) “29,\ 1996”
E) None of the above

24. In the following C++ statement, what is \texttt{Beta}?

\begin{verbatim}
Alpha = 4 * Beta(gamma, delta) + 3;
\end{verbatim}

A) int variable \quad B) float variable \quad C) void function \quad D) value-returning function

E) Not enough information provided to know
25. If \( \alpha \) and \( \beta \) are \textit{int} variables, which of the following is a valid C++ statement?

A) \( \alpha + \beta = \alpha \times \beta \);
B) \( 6 = \beta \);
C) \( \alpha \% \beta = \alpha + \alpha \times \beta + \beta \);
D) \( \alpha \times 2 = \beta \times 3 \);
E) None of the above are valid

26. In the following C++ statement, what is \textit{Display}?

\[
\text{Display}(\gamma, \delta);
\]

A) int variable  B) float variable  C) void function  D) value-returning function
E) Not enough information provided to know

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**Unix Commands (5 points) – Questions 27 – 31**

27. What Unix command is used to obtain the \textit{current working directory path} (shows you which directory you are in)?

28. Give the Unix command to \textit{create} the directory \textit{Programs}.

29. Give the Unix command to \textit{delete} the file \textit{MyProgram}

30. Give the Unix command that is used to \textit{copy} the file \textit{in.txt} to \textit{in.txt.bk}

31. Give the Unix command used in the labs to \textit{compile} the C++ program \textit{Program_04.cpp} and \textit{create an executable} named \textit{Program_04}?

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**Short Answer (49 points) – Questions 32 – 42**

32. (4 pts) Declaration statements

a) Provide a \textit{constant declaration} for a \textit{string} identifier of \textit{NAME} with a value of “Test”.

b) Provide a \textit{float variable declaration} for the identifier \textit{value}.
33. (4 pts) Assignment statements

a) Write a **statement that assigns** ‘H’ to the **char** variable `init`.

b) Write a **statement that assigns** the value 25 to the **int** variable `num`.

34. (3pts) Identifiers can consist of what types of characters (three distinct answers)?

35. (3pts) An expression is an arrangement of ________________, ________________
and ________________ that can be evaluated to compute a value of a given type.

36. (2 pts) What are two methods used to indicate comments in a C++ program?

37. (3 pts) The input stream buffer contains the following characters with the reading marker on the
A (`\n` represents the new line character): A B C
1 2 3
D E F
. What is the output to the terminal when the code segment below is executed? Place one character in each box.
**Hint**: Some variables have their value changed as the input is read. A □ indicates a space.

```cpp
int num1; char ch1, ch2;
cin.get(ch2);
cin.ignore(200, '\n');
cin >> num1;
cin.ignore(200, '3');
cin >> ch2 >> ch1;
cout << ch1 << "-" << num1 << "-" << ch2;
```

```plaintext

```
```
38. (4 pts) Show the output of each statement below. (output starts at the left side)
Place a single character in each box. Skip a box to indicate a space.

a) `cout << setw(6) << right << "Hello" << setw(3) << left << "World";`

```
H e l l o
```

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

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

39. (4 pts) The input stream buffer contains the following characters (`
` represents the new line character): `Hello
22.5 34.5
World
A
34
45`. What is the output to the terminal when the code segment below is executed? Place one character in each box.
A □ indicates a space.

```cpp
int m; float x; string text; char ch;
getline(cin, text, '\n');
cin >> m >> x;
cin.ignore(7, 'Z');
cin.get(ch);
cin.get(ch);
cout << m << "-" << x << "-" << text << "-" << ch << endl;
```

```
``
40. **(6 pts)** Show precisely the displayed output of the following `cout` statement.

- Write one character per box. A □ indicates a space.
- 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.

Example:  

```

text
```

```
spotrun.
```

```
cout << left << "Line\one\nLine\two" << endl;
cout << "the\next\n" << endl;
cout <<setw(6) << "line" << "is\not" << endl;
cout << setw(8) << right << "Line" << setw(8) << left << "three" << endl;
```

41. **(6 pts)** Write a segment of code that prompts the user for the price of an item and the quantity of that item purchased. These values are read in and the total cost of the purchase (quantity times item price) is calculated and output. Assume that all header files have been declared, and use the following variable declarations.

```
int quantity;    // number of items purchased
float price;     // cost for one item
float total;     // total cost of the order
```
42. (10 pts) Write a complete program (turn an empty file into a program that compiles, runs and performs the task mentioned.) that performs the following:

- Prompts the user to type in a sentence and uses the getline function to read the sentence (ending with the new line character) entered
- The sentence has two parts separated by a colon
- Output the original sentence and the location of the colon
- Assume that the sentence entered has a single colon in it
- Do not forget the necessary header files

**Sample output:** if the sentence is “This sentence:is split at the colon”, then the output is:

This sentence is:split at the colon
colon position is: 16