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 intentional 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.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>A statement that associates an identifier with a data object, a function or a data type</td>
</tr>
<tr>
<td>Semantics</td>
<td>The formal rules governing how valid instructions are written in a programming language.</td>
</tr>
<tr>
<td>Variable</td>
<td>Any constant value written in a program.</td>
</tr>
<tr>
<td>Data Type</td>
<td>A step-by-step procedure for solving a problem in a finite amount of time.</td>
</tr>
<tr>
<td>Named Constant</td>
<td>A location in memory, referenced by an identifier, which contains a data value that cannot be changed.</td>
</tr>
<tr>
<td>Declaration</td>
<td>A location in memory, referenced by an identifier, which contains a data value that can be changed.</td>
</tr>
<tr>
<td>Compiler</td>
<td>The implicit conversion of a value from one data type to another.</td>
</tr>
<tr>
<td>Syntax</td>
<td>The set of rules that determines the meaning of instructions written in a programming language.</td>
</tr>
<tr>
<td>Type Coercion</td>
<td></td>
</tr>
<tr>
<td>Reading Marker</td>
<td></td>
</tr>
</tbody>
</table>

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

B) A statement that associates an identifier with a data object, a function or a data type
C) The formal rules governing how valid instructions are written in a programming language.
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) Any constant value written in a program.
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 `start()` is required for every C++ program.
- T   F c) **Type casting** is the explicit conversion of one data type to another.
- T   F d) Algorithms are written by hand during the **implementation phase** of a program’s life.
- T   F e) A **value returning 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 `find()` function returns the **number of characters** contained in a string variable.
- T   F h) The `find()` function returns `string::npos` if it does not find its argument.
- T   F i) The `get()` function obtains the next character, regardless of what it is, from the input stream.
- T   F j) The `getline` function terminates on trailing whitespace characters only.
- T   F k) The statement `cin >> charVar;` reads the first **non white space** character from the input stream `cin` (charVar has been declared as a variable of data type char).
- T   F l) The `skip` 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) Name  B) _123  C) 2Bits  D) _House  E) all_Night

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

A) _Start  B) I’m#1  C) Hello  D) 4get  E) All:right
5. What is the name of the header file required for using `setw` and `setprecision`?
   A) iostream       B) iomanip       C) manip       D) string       E) cmath

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

7. Which of the following are control structures that can be used to structure statements in a program?
   A) Execution       B) Indexing       C) Looping       D) Selection
   E) Subprograms       F) Sorting       G) Coupling       H) Compiling

8. Which output manipulator(s) can be used to specify the output justification used with `setw`?
   A) setw       B) center       C) left       D) right
   E) None of the above

9. 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)
   ```cpp
   string firstName="Reginald";
   ????? mystery;
   mystery = firstName.find("AL");
   ```
   A) string::npos       B) string::size_type       C) string       D) int
   E) None of these

10. After the following code segment executes, what value is stored in the variable `result`?
    ```cpp
    float result;
    float num = 4;
    result = int(7/num + 0.5);
    ```
    A) 2       B) 1       C) 2.75       D) 2.25       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)
    ```cpp
    ????? mystery;
    string str1;
    str1.substr(5, mystery);
    ```
    A) float       B) string       C) string::size_type       D) char
    E) None of these
For questions 12-15, 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 = str3.length();  cout << num;
   ```
   A) 7  B) 8  C) 9  D) 10  E) string::npos

13. **What is the output** of the following program fragment listed below? (a □ indicates a space)
   ```cpp
   Position = str2.find("Cpe"); cout << Position;
   ```
   A) 0  B) 1  C) 3  D) 4  E) string::npos

14. **What is the output** of the following program fragment listed below? (a □ indicates a space)
   ```cpp
   Position = str1.find("s"); cout << Position;
   ```
   A) 0  B) 1  C) 3  D) 4  E) string::npos

15. **What is the output** of the following program fragment listed below? (a □ indicates a space)
   ```cpp
   str3 = str1.substr(4,6);  cout << str3;
   ```
   A) Clas  B) s□Clas  C)lass  D) □Class  E) None of the above

16. C++ is an example of a(n)
   A) Meta Language  B) Foreign Language  C) Assembly Language
   D) Low Level Language  E) Compiler  F) None of These

17. A(n) ____________________ is a function that is called as a stand alone statement
   A) Main Function  B) Value-returning function  C) Void Function
   D) Subprogram  E) None of These
18. Given the constant declaration and integer variable declaration

\[
\text{const int FACTOR = 95;}
\]
\[
\text{int num = 5;}
\]

Circle all of the following that are a valid use of FACTOR?

A) \(\text{cin >> FACTOR;}\)  B) \(\text{cout << FACTOR * 3;}\)  C) \(\text{FACTOR = 24;}\)  D) \(\text{num = num*FACTOR;}\)

E) None of the above are valid

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

\[
\begin{align*}
\text{A} & \text{BD} \\
\text{B} & \text{C}D
\end{align*}
\]

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

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

\[
\begin{align*}
\text{AB} & \text{D} \\
\text{C} & \text{BD}
\end{align*}
\]

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

\[
\begin{aligned}
ABCD\text{E}\nFEDC\text{B}A\n\text{char } ch; \\
\text{cin.ignore(4,\text{"\n\text{";}}) \\
\text{cin.get(ch);}
\end{aligned}
\]

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 \( \text{string2} \) assuming that the user inputs the text highlighted in gray? (\( \square \) indicates a space). \textit{The reading marker is on F}

\[
\begin{aligned}
\text{February}\square 29,\square 1996\n\text{string } \text{string1;} \\
\text{string } \text{string2;} \\
\text{getline(cin,}\text{string1,}'2'); \\
\text{getline(cin,}\text{string2,'\n'});
\end{aligned}
\]

A) “February\square 29,\square 1996” \\
B) “29,\square 1996” \\
C) “February\square” \\
D) “9,\square 1996” \\
E) None of the above

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

\[
\begin{aligned}
\text{February}\square 29,\square 1996\n\text{string } \text{string1;} \\
\text{cin.ignore(10,'r');} \\
\text{getline(cin,}\text{string1,}'\n');
\end{aligned}
\]

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

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

\[
\text{Beta} = 4 * \text{Beta*Alpha(gamma, delta)} + 3.0;
\]

A) int variable \\
B) float variable \\
C) char variable \\
D) value-returning function \\
E) Not enough information provided to know
25. If alpha and beta are integer variables, which of the following are a valid C++ statement?

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

26. In the following C++ statement, what is Display?

Display(gamma, delta);

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

UNIX/LINUX Commands (5 points) – Questions 27 – 31

27. What UNIX/LINUX command is used to obtain the current working directory path (shows you which directory you are in)?

28. Give the UNIX/LINUX command to create the directory Programs.

29. Give the UNIX/LINUX command to delete the directory Programs

30. Give the UNIX/LINUX command that is used to rename the file in.txt to in.txt.bk

31. Give the UNIX/LINUX command used in the labs to compile the C++ program Program_04.cpp and create an executable named Program_04?
Short Answer (49 points) – Questions 32 – 42

32. (4 pts) Declaration statements
   
   a) Provide a **constant declaration** for an **integer** identifier of **DAY** with a value of 6.

   b) Provide a **string variable declaration** for the identifier **month**.

33. (4 pts) Assignment statements
   
   a) Write a **statement that assigns** the character **H** to the **char** variable **init**.

   b) Write a **statement that assigns** the word **Hello** to the **string** variable **phrase**.

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

35. (3 pts) 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\nB\nC\n1\n2\n3\nD\nE\nF\n. 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.

   ```
   int num1; char ch1, ch2;
   cin.get(ch1);
   cin.ignore(200,'1');
   cin >> num1;
   cin.ignore(4,'E');
   cin >> ch2 >> ch1;
   cout << ch1 << "-" << num1 << "-" << ch2;
   ```
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) << left << “Hello” << setw(6) << right << “World”;

b) `cout << left << setw(8) << “Number” << setw(8) << “please” << “A”;

39. (4 pts) The input stream buffer for cin contains the following characters (\n represents the newline character): Hello\n34\nA\nWorld 34 45\n50 60 70. What is the output to the terminal when the code segment below is executed? Place one character in each box. Hint: Text and ch repeatedly have their value changed as the input is read. Reading marker is on the H of Hello

```cpp
int m; int x; string text; char ch;
generate(cin, text, ’\n’);
cin >> m >> text >> ch;
cin >> text;
cin >> ch;
cin.get(ch);
cin >> x >> m;
cout << m << “-” << x << “-” << text << “-” << ch;
```
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:

```
S p o t r u n
```

```
cout << right << "Line\none\n" << endl;
cout << "the\nnext";
cout << setw(6) << "line" << endl << "is\nnot" << endl;
cout << setw(6) << left << "Line" << "two" << endl;
```

41. (6 pts) Write a segment of code that:

- Prompts for and reads a line ending with a period into a string variable
- Determines and outputs the number of characters in the line
- Determines and outputs the starting character position of the word “Stop” in the line.
- Assume that all header files have been declared, and use the following variable declarations.

```
string line; // line read from input
string::size_type len, pos; // length of a line, position in a line
```
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:

- Prompt the user for a person’s first name (a single word),
- Input the response to the variable first,
- Prompt the user for a person’s last name (a single word),
- Input the response to the variable last,
- Concatenate variables first and last and store the result in the variable fullName,
- Output the value of fullName to the screen.

*Do not forget the necessary header files. Program is to be written to handle ANY name that is typed in not just the sample one provided*
Extra Credit #1 (2 pts) What is the output for the following segment of code?

```cpp
int num = 8;
num++; ++num; num++;
cout << num%6 << endl;  // mod arithmetic
  ++num;
cout << num << endl;
```

Extra Credit #2 (4 pts) Write a segment of code that prompts for and reads in an integer value indicating the number of dimes. Take that value and calculate the number of dollars and the number of dimes remaining. Output this information as shown below. Declare all variables needed in your segment. (hint: integer division and mod)

If 25 is entered, then the output is: **25 dimes is 2 dollars and 5 dimes.**
If 47 is entered, then the output is: **47 dimes is 4 dollars and 7 dimes.**