Instructions: This homework assignment focuses primarily on some of the basic syntax and semantics of C++. The answers to the following questions can be determined from Chapters 6 and 7 of the lecture notes and Chapters 2 through 6 of the text.

After you have analyzed the questions and decided what answers you believe are correct, you may find it useful to write some short programs to test your logic.

Opscan forms will be passed out in class. Write your name and code your ID number on the opscan form. Turn in your completed opscan at the place and time specified by your Instructor. Opscans will not be accepted at any other place or time.

For questions 1 through 4, consider executing the code fragment:

```cpp
bool A, B, C, D;
// code that assigns values to A, B, C, and D
if (A && !B)
    if (C || !D)
        cout << "one" << endl;
    else if (D)
        cout << "two" << endl;
else
    cout << "three" << endl;
else if (C == D)
    cout << "four" << endl;
else if (C)
    cout << "five" << endl;
else
    cout << "six" << endl;
```

1. What of the following sets of values for A, B, C, and D would cause the string "two" to be printed?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>true</td>
<td>false</td>
<td>true</td>
</tr>
<tr>
<td>2)</td>
<td>true</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>3)</td>
<td>true</td>
<td>false</td>
<td>false</td>
</tr>
<tr>
<td>4)</td>
<td>true</td>
<td>false</td>
<td>false</td>
</tr>
<tr>
<td>5)</td>
<td>false</td>
<td>false</td>
<td>true</td>
</tr>
<tr>
<td>6)</td>
<td>false</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>7)</td>
<td>false</td>
<td>false</td>
<td>true</td>
</tr>
<tr>
<td>8)</td>
<td>false</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>9)</td>
<td>None of these</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. What of the following sets of values for A, B, C, and D would cause the string "four" to be printed?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>false</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>2)</td>
<td>false</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>3)</td>
<td>false</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>4)</td>
<td>false</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>5)</td>
<td>1 and 4 only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6)</td>
<td>2 and 3 only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7)</td>
<td>None of these</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. What of the following sets of values for A, B, C, and D would cause the string "five" to be printed?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>false</td>
<td>true</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>2</td>
<td>false</td>
<td>true</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>3</td>
<td>false</td>
<td>true</td>
<td>false</td>
<td>true</td>
</tr>
<tr>
<td>4</td>
<td>false</td>
<td>true</td>
<td>false</td>
<td>false</td>
</tr>
</tbody>
</table>

5) 1 and 4 only  
6) 2 and 3 only  
7) None of these

4. Consider executing the following code fragment (assume x is an int variable):

```cpp
if (x <= 0) {  
cout << "One" << endl;
} else if (x <= 10) {  
cout << "Two" << endl;
} else if (x <= 20) {  
cout << "Three" << endl;
}
```

The string "Two" will be printed if and only if x satisfies the condition:

1) x <= 10  
2) 0 < x and x <= 10  
3) 0 < x and x <= 10  
4) 0 <= x and x < 10  
5) 0 <= x  
6) None of these

5. What value is printed for loopCount if the following code fragment is executed?

```cpp
int loopCount = 1, alpha = 5;
while (loopCount <= 145) {
    alpha = alpha + 7;
    loopCount++;
}
cout << "loopCount = " << loopCount << endl;
```

1) 1  
2) 144  
3) 145  
4) 146  
5) None of these

6. What value is printed for someInt when the following code fragment is executed?

```cpp
int someInt = 273;
while (someInt > 500) {
    someInt = someInt - 3;
    cout << "someInt = " << someInt << endl;
}
```

1) 270  
2) 273  
3) 497  
4) 500  
5) Infinite loop  
6) None of these
7. What is the logical condition under which the following while loop will terminate?

```cpp
int Beta = 5;
while (Beta >= 0 && Beta < 10) {
    cout << Beta << endl;
    cin >> Beta;
}
```

1) Beta < 0 && Beta >= 10  
2) Beta <= 0 && Beta > 10  
3) Beta < 0 || Beta > 10  
4) Beta <= 0 || Beta >= 10  
5) Beta < 0 || Beta > 10  
6) None of these

8. What is the output of the following code fragment?

```cpp
int n = 1;
while (n <= 5) {
    cout << n << ' '; 
    n++;
}
```

1) 1 2 3 4 5  
2) 1 2 3 4  
3) 1 1 1 forever  
4) 2 3 4 5  
5) 2 3 4 5 6  
6) None of these

9. What is the output of the following code fragment?

```cpp
int n = 1;
while (n <= 5) {
    cout << n << ' '; 
    n++;
}
```

1) 1 2 3 4 5  
2) 1 2 3 4  
3) 1 1 1 forever  
4) 2 3 4 5  
5) 2 3 4 5 6  
6) None of these

10. What is the output of the following code fragment? (Be careful here.)

```cpp
int n = 1;
while (n <= 5) {
    cout << n << ' '; 
    n++;
}
```

1) 1 2 3 4 5  
2) 1 2 3 4  
3) 1 1 1 forever  
4) 2 3 4 5  
5) 2 3 4 5 6  
6) None of these

11. When designing a specification for an input file, which of the following would be a poor choice for a sentinel value?

1) a value of 79 for voter ages  
2) a value of 800 for SAT scores  
3) a value of -1 for student heights  
4) a value of "No one" for student names  
5) All of them  
6) 1 and 2 only  
7) 1 and 3 only  
8) 2 and 3 only  
9) 2 and 4 only  
10) None of these
12. With respect to the loop in the following `main()` function, what is missing?

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

int main() {
    int loopCount = 4;
    int Output = 7;
    while (loopCount <= 8) {
        cout << Output << endl;
        Output++;
    }
    return 0;
}
```

1) the initialization of the loop control variable
2) the testing of the loop control variable
3) the update of the loop control variable
4) Nothing is missing.

13. Indicate where (if at all) the following loop needs a priming read.

```cpp
int Sum = 0; // line 1
int Number; // line 2
while (inFile) { // line 5
    Sum = Sum + Number; // line 7
    inFile >> Number; // line 9
}
```

1) before line 1 5) at line 8
2) at line 2 6) at line 10
3) at line 4 7) No priming read is necessary.
4) at line 6

14. To produce the output 2 4 6 8 10, what loop condition should be used in the blank below?

```cpp
int N = 0;
do {
    N = N + 2;
    cout << N << ' ';
} while (_______);
```

1) N <= 10 3) N < 8
2) N < 10 4) N >= 2
5) N > 8
6) None of these
15. After execution of the following code, what value is printed for Length?

```c
int Length = 5,
    Count = 4;
while (Count <= 6) {
    if (Length >= 100)
        Length = Length - 2;
    else
        Length = Count * Length;
    Count++;}
cout << "Length = " << Length << endl;
```

1) 20  3) 100  5) None of these
2) 98  4) 600

16. In the following code fragment, a semicolon appears at the end of the line containing the while condition.

```c
cout << 'A';
int loopCount = 1;
while (loopCount <= 3); {  
    cout << 'B';
    loopCount++;
}
cout << 'C';
```

The result will be:

1) the output AC  4) a compile-time error
2) the output ABC  5) an infinite loop
3) the output ABBBC  6) None of these

17. What is the output of the following code fragment?

```c
int Sum = 0,
    outerCount = 1;
while (outerCount <= 3) {
    int innerCount = 1;
    while (innerCount <= outerCount) {
        Sum = Sum + innerCount;
        innerCount++;
    }
    outerCount++;
}
cout << Sum << endl;
```

1) 1  3) 10  5) 35
2) 4  4) 20  6) None of these
18. Which `for` loop is equivalent to the following `while` loop? Equivalent here means that the value of each of the variables would be the same when the code has completed execution.

```c
int count = -5, sum = 0;
while (count <= 15) {
    sum = sum + count;
    count++;
}
```

1) `int count, sum = 0;
for (count = -5; count <= 15; count++)
    sum = sum + count;`  
2) `int count, sum = 0;
for (count = -5; count <= 15; count++) {
    sum = sum + count;
    count++;
}
```
3) `int count, sum;
for (count = -5, sum = 0; count <= 15; count++) {
    sum = sum + count;
}
```
4) `int count, sum = 0;
for (count = 1; count <= 21; count++)
    sum = sum + count;`

5) All of these  
6) 1 and 2 only  
7) 1 and 3 only  
8) 1 and 4 only  
9) None of these

19. What is the output of the following code fragment?

```c
for (int loopCount = 1; loopCount <= 6; loopCount = loopCount + 2)
    cout << loopCount << ' ';

cout << "Done" << endl;
```

1) Done  
2) 1 Done  
3) 1 3 Done  
4) 1 3 5 Done  
5) 1 3 5 7 Done  
6) None of these

20. What is the output of the following code fragment?

```c
for (int loopCount = 1; loopCount > 3; loopCount++)
    cout << loopCount << ' ';

cout << "Done" << endl;
```

1) Done  
2) 1 Done  
3) 1 2 Done  
4) 1 2 3 Done  
5) 1 2 3 4 Done  
6) None of these
21. In the following code fragment, the programmer mistakenly placed a semicolon at the end of the for statement heading. What is the result?

```cpp
cout << 'A';
for (int count = 1; count <= 3; count++) {
    cout << 'B';
    cout << 'C';
}
```

1) a compile-time error 4) the output ABBC
2) an infinite loop 5) the output ABBBC
3) the output ABC 6) None of these

22. What is the output of the following code fragment?

```cpp
int n = 2;
for (int loopCount = 1; loopCount <= 3; loopCount++) {
    while (n <= 4)
        n = 2 * n;
    cout << n << endl;
}
```

1) 4 4) 32
2) 8 5) 64
3) 16 6) None of these

For the next three questions, consider the following code fragment:

```cpp
const int numIterations = 10; // Line 1
for (int oCount = 0; oCount < numIterations; oCount++) { // Line 2
    int Length = numIterations - oCount; // Line 3
    for (int iCount = 0; iCount < Length; iCount++) { // Line 4
        cout << 'x'; // Line 5
    }
    cout << endl; // Line 6
}
cout << "all done" << endl; // Line 7
```

23. According to the C++ Standard, what is the scope of the identifier `numIterations`?

1) line 1 only 3) lines 1, 2 and 7 only 5) None of these
2) lines 1 and 7 only 4) lines 1 through 7

24. According to the C++ Standard, what is the scope of the identifier `Length`?

1) line 3 only 3) lines 3 and 6 only 5) None of these
2) lines 3 through 6 only 4) lines 3 through 7 only

25. According to the C++ Standard, what is the scope of the identifier `iCount`?

1) line 4 only 3) lines 4, 5 and 6 only 5) None of these
2) lines 4 and 5 only 4) lines 4 through 7