

PRINT your name at the top of every page — NOW (10 times)

Student ID _____

Lab Section _____

Lecture Section _____

What is your intended major (if you know)? _____

This test is closed book, closed notes.

The points value of each question is given in [] brackets after the question number.

1. [5] What are the values of the following legal C++ expressions?

(a) $10 + 2 * 3$

(b) $6 - 7 + 5 / 3$

(c) $22 \% 5$

(d) $3 + 5 * 3 - 1 / 4$

(e) $(3 + 5) / 3 - 4$

2. [2] What base ten integer corresponds to the eight-bit two's complement number 00001101?

3. [4] Write down the eight-bit, two's complement representation of the base ten number -9 (i.e. negative nine).

4. [6] Circle the items that are **valid** C++ object identifiers.

- (a) be.good (f) bank-rate
(c) if (h) FLOAT
(d) letter_2 (i) 5letter

5. [4] What is printed by the following code fragment? (assume `iostream` is included)

```
int i = 2;  
int j = 3;  
i += j;  
j *= j;  
cout << i << endl;  
cout << j << endl;
```


6. [4] What is the output of the following code segment? (again, assume `iostream` is included)

```
int a = 0;  
int b = 1;  
a = b;  
b = a;  
cout << a << endl;  
cout << b << endl;
```


7. [6] Given these values for the **int** variables *i*, *j*, *m*, and *n*:

i=6, *j*=7, *m*=11, *n*=11.

what is the output of the following code (assuming `iostream` is included)

```
cout << "Johnny ";
if (i < j)
    if (m == n)
        cout << "has ";
    else
        cout << "has not ";
        cout << "quite ";
if (i >= m)
    cout << "eaten his spinach";
else
    cout << "eaten his broccoli";
```

8. [6] Suppose the following definitions are in effect.

```
int i = 9;
int j = 4;
float a = 1.0;
float b = 4.0;
int I;
float X;
```

In each of the following statements write down the value which is stored in the variable (object) on the left-hand side of the statement. If a statement is illegal, say so. Show real (i.e. float) values with an embedded decimal point (e.g. 4.0), whereas integers should be shown without a decimal point (e.g. -33)

<code>I = j / i;</code>	_____
<code>X = a / b;</code>	_____
<code>X = a % j;</code>	_____
<code>I = a / b;</code>	_____
<code>X = i * a + j * b;</code>	_____
<code>I = (i % j) + (a / b);</code>	_____

9. [8 — 4 & 4] What is the output (assuming `iostream` is included) of the following code segment? (this is why good indentation is helpful)

```
int x = 2; if (x == 1) { cout << "yes" << endl; } else
if (x == 2) { cout << "no" << endl; } else cout << "maybe" <<
endl;
```

What is the output of the previous code segment if `x` is initialized to `-1` rather than `2`?

10. [3] Why does the following correct code fragment probably represent a programmer error?

```
if (i = ListSize) {
    cout << "We are all done\n";
}
```

11. [5] Suppose you have a digital timer that displays the elapsed time in hours, minutes and seconds. The `int` variable `tick` contains the number of seconds that have elapsed since the start button was pressed. The `int` variable `minutes` contains the the number displayed in the minutes display of the timer.

Before the start button is pressed, the values of all the displays, and of variable `tick`, are equal to zero. Now the start button is pressed, and the value of `tick` is incremented each second.

Which C++ statement below sets the variable `minutes` to its appropriate value after `tick` seconds have passed

- (a) `minutes = tick / 60;`
- (b) `minutes = tick % 60;`
- (c) `minutes = (tick % 60) / 60;`
- (d) `minutes = (tick / 60) % 60;`
- (e) `minutes = (tick % 60) % 60;`

12. [9] What is the output of the following program segment? (assume `iostream` is included)

```
int Counter1 = 2;
int Counter2 = 4;
int Counter3 = 6;
for (int i = 1; i <= 10; ++i) {
    ++Counter1;
    for (int j = 1; j <= 30; ++j) {
        ++Counter2;
    }
    ++Counter3;
}
cout << Counter1 << endl << Counter2 << endl << Counter3;
```

13. [2] What is the difference between the numeric literal `5.0` and the numeric literal `5`?

- (a) `5.0` is represented in binary while `5` is not
- (b) `5.0` is numerically greater than `5`
- (c) `5.0` has a floating point type but `5` has an integer type
- (d) There is no difference
- (e) None of the above are true

14. [10] The program shown below is to read two integers from the keyboard. If the first number is less than the second, the program displays their sum on the monitor. If the first number is equal to the second, the program displays their product. If the first number is greater than the second, the program displays the difference between the first number and the second number. For example, given the input: 9 4, the output would be 5. As another example, given the input: 5 5, the output would be 25. Finish the program below so that it meets the preceding specification. Do your rough work on a separate sheet of paper, or on the back of this sheet. Write your **final** answer below, **clearly**.

```
#include <iostream>
#include <string>
using namespace std;
int main () {
    int FirstNbr;
    int SecondNbr;
    // input the two numbers
    cout << "Please input two integer values: " << endl;
    cin >> FirstNbr >> SecondNbr;
    // compute and display Sum, Difference, or Product
    // depending whether the inputs are the same or not

    // we are all done
    return 0;
}
```

15. [4] What happens in the following loop?

```
for (int n = 1; n > 0; n = n * 10) {
    cout << "Value of n is: " << n << endl;
}
```

- (a) The loop never terminates, printing out larger and larger values of n.
- (b) The loop never terminates, printing out the same value of n over and over again.
- (c) The loop never terminates, and doesn't print out anything.
- (d) Eventually, n overflows, after some correct values are printed
- (e) The loop terminates when n = 10.

16. [6] What is the output of the following code segment (assume `iostream` is included):

```
int k = 4;
do
{
    cout << k - 1 << " ";
    k = k - 2;
} while ( k > 0);
```

17. [10 — 6 & 4] The following code segment is supposed to output the even-valued numbers between 1 and 11. The `iostream` library is included. It has two logical errors:

```
int n = 2;
while ( n != 11)
{
    n = n + 2;
    cout << n << " ";
}
```

(i) What is the output of the code as written? _____

(ii) Change the code above so that it works properly.

18. [10] What are the values of the variables p and q after the following program segment has been executed?

```
int p = 8;
int q = 2;

while ( p < 14)
{
p = p + q ;
q = q * q ;
}
```

The value of q is: _____

The value of p is: _____

19. [15] What is the output of the following program segment:

```
int i = 1;
int j, sum;
while (i <= 3)
{
    sum = 0;
    j = 1;
    while (j <= i)
    {
        sum = sum + j;
        j = j + 1;
    }
    cout << sum << ' ';
    i = i + 1;
}
```


20. [5] Suppose that we have the two statements:

- (A) `int x = 4;`
- (B) `const int x = 4;`

Which of the following are true statements? (Circle all that apply)

- (a) in (B), x can only be changed by reading in a new value from the keyboard.
- (b) the syntax of (B) is illegal.
- (c) (A) and (B) mean the same thing.
- (d) in case (B) the value of x cannot be modified from its value 4.
- (e) if both statements occur next to each other, then the two x's are different variables.

21. [6] Here is a C++ function prototype:

```
double DeltaWeight ( float weight1, float weight2);
```

- (i) What is "DeltaWeight" called? _____
- (ii) What value (object) will have type "double"? _____
- (iii) What are "weight1" and "weight2" called? _____

22. [20] Write a complete program on the next page which tells a user how much gas she needs, at 22.5 miles per gallon, to drive a certain distance. The program (do **not** include comments) should prompt the user to enter the number of miles for the trip (an integer value) and should print out a message which, with appropriate substitutions for xxxx and yyyy, looks like:

For a trip of xxxx miles you will need yyyy gallons of gas

Write and sign the PLEDGE here:

PLEDGE:

This page for the program of the preceding question.