CS 002
Exam 1 Review

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Checked by groups 1 and 6

T/F

1. Variables may be defined inside the body of a loop. **True**
2. A variable may be defined in the initialization expression of the `for` loop. **True**
3. The = operator and the == operator perform the same operation when used in a Boolean expression. **False**
4. When an `if` statement is nested in the `if` part of another statement, the only time the inner `if` is executed is when the expression of the outer `if` is true. **True**
5. When an `if` statement is nested in the `else` part of another statement, as in an `if/else if`, the only time the inner `if` is executed is when the expression of the outer `if` is true. **False**

6. Which of the following are not valid assignment statement?

```
a. product = n * m;
b. n + m = sum;
c. result = result  + 5;
d. 5 = n – m;
e. b) and d)
f. c) and d)
```

7. In C++, a variable
   a. gives a name to a location in memory that holds a value
   b. takes up a different amount of space in memory depending on its type
   c. can have its value changed by certain statements in a program
   d. should be given meaningful names to help the readability of the program
   e. exists in memory only when the program is running.
   f. all of the above
8. Which of the following `if` statements will multiply the value of the variable `pay` (type double) by one-and-a-half if and only if the value of the boolean variable `worked_overtime` is true?

```
a. if (pay  == worked_overtime) pay = pay *1.5;
b. if (worked_overtime) pay == pay *1.5;
c. if (worked_overtime) pay = pay *1.5;
d. if (worked_overtime = true) pay = pay *1.5;
e. both c) and d)
f. none of the above
```

9. What will be output to the terminal by the following code?

```
int n = 10;
if (n < 10) {n -= 5;}
else if (n>10){ n+=5;}
cout << n;
```

   a. 5
   b. 10
   c. 15
   d. n
   e. nothing will be output in this code block

10. Which of the following conditional expressions will evaluate to true if the integer variable x contains the value 1024, and false if it contains the value 93?

```
a. is_even( x )
b. ( x / 2 = 0)
c. ( x / 2 == 0)
d. (x % 2 = 0)
e. (x % 2 == 0)
f. none of the above
```

11. What is the output of the following code snippet?

```
string phrase = “pollos hermanos”;
cout << phrase.find(“os”);
```

a) 1
b) 4
c) 13
d) 5

e) string :: npos f) none of the above

12. What is the value of the expression `(5 != 10)`? **True**

13. Which of the following if/else statements will assign true to the Boolean variable fever if the variable temperature is greater than 98.6, and false otherwise?(consider ALL options carefully)

```
a. if(temperature>98.6) fever == true;
   else fever = false;
b. if (fever == true) temperature = 98.6;
   else fever = false;
c. if (fever ) temperature ==98.6;
   else fever = false;
d. if(temperature>98.6) fever = true;
   else fever = false;
e. fever = false;
   if (temperature > 98.6)  fever = true;
```

f. both d) and e)

14. Briefly explain and correct the error(s) in each of the code segments below.

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a.)
```
string word;
cout << "Enter a word: ";
cin << word;
```

cin does not support the insertion operator so `cin << word` should be `cin >> word` instead to pull from the stdin.

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b.)
```
cout << "Two plus two is " 2+2;
```

The expression 2+2 is not being inserted into the cout. Additionally, this will produce a syntax error. It should be changed to

cout << “Two plus two is ” << 2 + 2;

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c.)
```
if ( x = 1 );
   cout << x;
```

By putting a semicolon at the end of the if, the cout statement is not a part of the if statement and will always be executed. Additionally, the equals should be a double == for comparison. It should be changed to

```
if (x == 1)
    cout << x;
```

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d.)
```
if ( x = 1 or 2 )
   cout << x;
```

‘or’ is not a keyword in C++ nor a proper way to do an or comparison. Additionally, the equal sign is not a comparison operator unless there is 2 of them. This should be changed to

```
if (x == 1 || x == 2)
    cout << x;
```

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e.)
```
//This code is supposed to
//compute 10!
int N = 10;
int factorial = 1;
while ( N >= 1 ) {
    factorial = factorial * N;
    N--;
    cout << "10! is " <<
    factorial << ".\n";
}
```

The output statement should only occur after the factorial is calculated and hence be moved out of the while loop. It should be changed to

```
int N = 10;
int factorial = 1;
while ( N >= 1 ) {
   factorial = factorial * N;
   N--;
```

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```
}
cout << "10! is " << factorial <<
".\n";
```

15. Write a program (starting from #include) that repeatedly collects positive integers from the user, stopping when the user enters a negative number or zero. After that, output the product of all positive entries. A sample run should appear on the screen like the text below.

```
Enter a number: 3
Enter a number: 10
Enter a number: 2
Enter a number: -213
The product of all your positive numbers is 60.
```

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

int main()
{
  int product = 1;
  int number;

  do {
    cout << "Enter a number: ";
    cin >> number;

    if (number >= 0) {
      product *= number;
    }

  } while (number >= 0);

  cout << "The product of all your positive numbers is " << product
    << ".\n";

  return 0;
}
```

16. Which expression will always be true if the value of the variable x (type double) is between or equal to -1.0 and 1.0, and will always be false for other values of x?

a. `(-1.0 <= x <= 1.0)`
b. `(x >= -1.0 && <= 1.0)`
c. `(x >= -1.0) || ( x <=  1.0)`
d. `(1.0 >= x >= -1.0)`
e. `(x <= 1.0) || ( x >=  -1.0)`
f. `none of the above`

17. In a while loop, the loop body is executed:

a. Once only
b. Only if the condition is true
c. The same number of times as the loop condition is evaluated
d. Once less than the number of times the loop condition is evaluated
e. Once more than the number of times the loop condition is evaluated
f. Both b) and d)

18. Which of the following for loop headers will output the sum of all the odd integers between 100 and 200?

```
int sum = 0;
for (        ??              ){ sum += i;}
cout << "\nSum is " << sum << endl;
```

a. `int i = 0; i < 200; i++`
b. `int i = 0; i < 200; i = i + 2`
c. `int i = 100; i % 2 == 1 && i <= 200; i++`
d. `int i = 101; i < 200; i+=2`
e. `int i = 101; i <= 200; i+=2`
f. both d) and e)

19. What is output by the following code fragment?

```
int x = 10;
while (x > 0)
{
     cout << x << " ";
     if (x > 5)
       x = x -2;
     else
       x = x – 1;
}
```

a. 10
b. 10 8 6 4 3 2 1
d. 8 6 4 3 2 1
e. 8 6 4 3 2 1 0

20. What will the following program display?

	Display Output

`#include <iostream>`
`using namespace std;`
 	
`int main()`
`{`
`int integer1, integer2;`
`double result;`
 	
`integer1 = 19;`
`integer2 = 2;`
`result = integer1 / integer2;`
`cout << result << endl;`
`result = static_cast<double>(integer1) / integer2;`
`cout << result << endl;`
`result = static_cast<double>(integer1 / integer2);`
`cout << result << endl;`
`return 0;`
`}`
	9
	9.5
	9

21. What will the following program segments display?

		Display output			Display output

a.	`x = 2;`
	`y = x++;`
	`cout << x << y;`
		22	d.	`x = 2;`
				`y = 2*x++;`
				`cout << x++ << y;`
					34

b.	`x = 2;`
	`y = ++x;`
	`cout << x << y;`
		23	e.	`x = 99;`
				`if (x++ < 100)`
				`cout << "It is true!\n";`
				`else`
				`cout << "It is false!\n";`
					It is true!

c.	`x = 2;`
	`y = 4;`
	`cout << x++ << --y;`
		23	f.	`x = 0;`
				`if (++x)`
				`cout << "It is true!\n";`
				`else`
				`cout << "It is false!\n";`
					It is true!

22. What will the following program segments display?

		Display output

a.	`int count = 10;`
	`do`
	`{`
	`  cout << "Hello World\n";`
	`  count++;`
	`}while(count < 1);`
		`Hello World`

b.	`int v = 10;`
	`do`
	`{`
	`  cout << v << endl;`
	`  count++;`
	`}while(v < 5);`
		`If count isn't defined, then a syntax error. Else:`
		
		`10`

c.	`int count = 0, number = 0, limit = 4;`
	`do`
	`{`
	`  number += 2;`
	`  count++;`
	`}while(count < limit);`
	`cout << number << " " << count << endl;`
		`8 4`

23. Write an input validation loop that asks the user to enter a number in the range of 10 through 25.

```
int number;
do {
        cout << "Enter a number between 10 and 25: ";
        cin >> number;
} while (number < 10 || number > 25);
```

24. Write an input validation loop that asks the user to enter 'Y', 'y', 'N', or 'n'.

```
char confirmation;
do {
        cout << "Enter [Y/N]: ";
        cin >> confirmation;
} while (confirmation != 'Y' && confirmation != 'y' &&
                confirmation != 'N' && confirmation != 'n');
```

25. Use nested for loops to produce the following output:

```
        *
       **
      ***
     ****
    *****
   ******
  *******
 ********
*********
```

```
int width = 9;
for (int i = 1; i <= width; ++i)
{
      for (int j = width - i; j >= 1; --j) {
            cout << ' ';
      }

      for (int w = width - i; w < width; ++w) {
            cout << '*';
      }

      cout << endl;
}
```

26. What bit patterns are represented by the following hexadecimal notations?
    a. BD => 1011 1101
    b. 76 => 0111 0110

27. Express the following bit patterns in hexadecimal notation: 1010 0000 1010

    A0A

28. Convert each of the following binary representations to its equivalent base ten representation:
    a. 1101 => 13
    b. 0101 => 5
    c. 11001 => 25
    d. 1000 => 8

29. Convert each of the following excess 16 representations to its equivalent base ten representation:
    a. 10101 => 5
    b. 10001 => 1
    c. 01011 => -5

30. Convert each of the following base ten representations to its equivalent excess four representation:
    a. 2 => 1010
    b. -3 => 0001
    c. 1 => 1001

31. Convert each of the following two's complement representations to its equivalent base ten representation:
    a. 01111 => 15
    b. 10100 => -12
    c. 01100 => 12

32. Convert each of the following base ten representations to its equivalent two's complement representation in which each value is represented in 7 bits:
    a. 11 => 0001011
    b. -11 => 1110101
    c. -2 => 1111110

33. Perform each of the following additions assuming the bit strings represent values in two's complement notation. Identify each case in which the answer is incorrect because of overflow.
    a. 01101 + 01010 = 10111 (OVERFLOW)
    b. 00111 + 11110 = 00101 = 5

34. Convert each of the following binary representations into its equivalent base ten representation:
    a. 11.111 => 3.875
    b. 101.1101 => 5.8125

35. Express in binary notation.
    a. $4\frac{3}{8}$ => 100.011
    b. $12\frac{15}{16}$ => 1010.1111

36. Decode the following bit patterns using the floating-point format described in the notes:
    a. 01011011 => 1.011 => 1.375
    b. 11011000 => -1.000 => -1

37. Encode the following values using the 8-bit floating-point format described in the notes. Indicate each case in which a truncation error occurs.
    a. $\frac{1}{4}$ => 0.01 => 00111000
    b. $-5\frac{1}{8}$ => -101.01 => 11111010 (TRUNCATION ERROR)