CMPT 130: Week 2 Lab Work

Code Analysis Questions

When you answer the following questions, first answer them on paper without typing the code in a computer. After that type the codes as complete C++ programs, run your programs and see if you get the answers correct. If you don't get the answers correct, analyze the codes on paper again and again until you make sense of the programs and get the output correct.

1. What is the output of the following program?

```
int main()
{
        char a, b, c;
        a = 'b';
        b = 'c';
        c = a;
        cout << a << b << c << 'c';
        system("Pause");
        return 0;
}
```

2. What is the output of the following program?

```
int main()
{
        int number = (1/3) * 3;
        cout << "(1/3) * 3 is equal to " << number;
        return 0;
}
```

3. What is the output of the following C++ code fragment assuming it is placed inside a valid C++ program?

```
int a = 5, b = 7;
cout << ++a << ", " << b++ << endl;
cout << a-- << ", " << ++b << endl;
cout << ++a << ", " << --b << endl;
cout << a-- << ", " << b++ << endl;
cout << ++a+ b++ << endl;
cout << a--+ ++b << endl;
int c = a++ + ++b;
cout << c << endl;
c = a-- - --b;
cout << c << endl;
c = c++ - ++a  + --b;
cout << c << endl;
```

4. Given the following fragment that purports to convert from degrees Celsius to degrees Fahrenheit, answer the following questions:

```
double c = 20;
double f;
f = (9/5) * c + 32.0;
```

a) What value is assigned to f?
b) Explain what is actually happening, and what the programmer likely wanted.
c) Rewrite the code as the programmer intended to do.

5. What is the out of the following C++ program

```
int a = 5;
int b = 3;
int result = a / b;
cout <<  result << endl;
result = a * 1.0 / b;
cout <<  result << endl;
result = a + 1.0 / b;
cout <<  result << endl;
result = (a + 1.0) / b;
cout <<  result << endl;
result = a + (1.0 / b);
cout <<  result << endl;
result = a / 1.0 * b;
cout <<  result << endl;
result = a / 1.0 + b;
cout <<  result << endl;
result = a + 4 / b;
cout << result << endl;
result = a + b * (a – b)  / b % a;
cout << result << endl;
```

6. What is the output of the following code snapshot assuming it is embedded inside a valid C++ program

```
float x = 3 + 5/7;
cout << x * 7 / 2 << endl;
```

7. What is the output of the following code snapshot assuming it is embedded inside a valid C++ program

```
int a = 25;
int b = 4;
cout << a / b << endl;
cout << static_cast<float>(a) / b << endl;
cout << a / static_cast<float>(b) << endl;
cout << static_cast<float>(a) / static_cast<float>(b) << endl;
cout << static_cast<float>(a / b) << endl;
cout << a  << ", " << b << endl;
float result = a / b;
cout << result << endl;
result = static_cast<float>(a / b);
cout << result << endl;
int c = static_cast<float>(a) / b;
cout << c << endl;
c = a / static_cast<float>(b);
cout << c << endl;
result = static_cast<float>(a) / static_cast<float>(b);
c = static_cast<float>(a) / static_cast<float>(b);
cout << result << "   " << c << endl;
```

8. Analyze the following program and determine its output

```
#include <iostream>
using namespace std;
int main()
{
	char c1 = 65;
	char c2 = 321;
	char c3 = -191;
	char c4 = 'A';
	cout << c1 << endl;
	cout << c2 << endl;
	cout << c3 << endl;
	cout << c4 << endl;
	system("Pause");
	return 0;
}
```

9. Analyze the following program and determine its output

```
#include <iostream>
using namespace std;
int main()
{
   int a = 144;
   char b = 144;
   cout << a << endl;
   cout << -a << endl;
   cout << +a << endl;

   cout << b << endl;
   cout << +b << endl;
   cout << -b << endl;

   system("Pause");
   return 0;
}
```

Programming Questions

10. Write a complete C++ program that reads two integer values in the range [1, 30] representing calendar days from the user and then prints the number of days between the two calendar days. For example if you enter 5 for the first variable and 27 for the second variable, then your program must print "There are 22 days between day 5 and day 27". Of course it is ok if your program prints the days as a negative number such as "There are -22 days between day 5 and day 27". The reason why you may get negative output is that you don't know if you will be subtracting the smaller day from the larger or vice versa; after all you don't know which variable will get the larger day and which one gets the lesser day until you run your program.

11. Write a complete C++ program that reads two integer values in the range [1, 12] representing calendar months from the user and then prints the number of days between the two calendar months. Assume a month has 30 days. For example if you enter 5 for the first variable and 1 for the second variable, then your program must print "There are 120 days between month 5 and month 1". Of course it is ok if your program prints the days as a negative number such as "There are -120 days between month 5 and month 1".

12. Write a complete C++ program that reads two integer values representing calendar years from the user and then prints the number of days between the two calendar years. Assume a year has 360 days. For example if you enter 1987 for the first variable and 2015 for the second variable, then your program must print "There are 10080 days between year 1987 and year 2015". Of course it is ok if your program prints the days as a negative number such as "There are -10080 days between year 1987 and year 2015".

13. Write a C++ program that declares six variables named y1, m1, d1, y2, m2, and d2 all as integer data types. Now read the birth day of a child 1 in y1, m1 and d1 variables where y1, m1 and d1 represent the year, month and day of child 1. Then read the birthday of child 2 in y2, m2, and d2 variables. Finally print how

many days there are between the birth dates of the two children. It is ok if your program prints the number of days as negative or positive.

14. Repeat Q13 but this time your program must print the number of years, number of months and numbers of days between the birth dates of the two children.

15. Write a program that asks the user to enter a non-negative integer in the range [0, 255] and prints the unsigned binary representation of the number in byte pattern. Hint: calculate eight variables b1, b2, b3,...,b8 corresponding to the eight binary bits. Assume the user will always enter a number in the range [0, 255]. Use modulo operator in order to make the computation easy.

16. Answer Question number #15 above without using modulo operator.

17. In Canadian currency, the available coin denominations are **toonie** (2 dollar coin), **loonie** (one dollar coins), **quarter** (25 cents), **dime** (10 cents), **nickel** (5 cents) and **penny** (1 cent). Write a C++ program that reads an amount of money from the user as a double data type (for example 17.69 to mean seventeen dollars and 59 cents) and prints the number of coins of each denomination such that the number of coins you need is the minimum among all possible combination of coins that give rise to the amount of money the user entered. For example an amount of money 17.69 must print 8 toonies, 1 loonie, 2 quarters, 1 dime, 1 nickel and 4 pennies.