CSC 2000
Introduction to C++ Programming Language
Assignment 01

50 points

Due 01/27/2020 (11:45 A.M.)

Assignment Objectives:
. Explore simple data types
. Discover how to use arithmetic operators
. Examine how a program evaluates arithmetic expressions
. Learn what an assignment statement is and what it does
. Discover how to input data into memory using input statements
. Become familiar with the use of increment and decrement operators
. Examine ways to output results using output statements

Answer questions 1 to 7 on a word file; write a program for each of Q.7 - Q.10.
All assignments must be submitted by the Canvas. **No email or hard copy** is accepted. You must follow the following format:

a. For non-programming questions, use a word file to type your answers. Don't use the text box on the Canvas to answer the questions or to write comments, we will not read it.
b. State your answer clearly.
c. For programming questions, include only the source file for each problem.
d. Submit your file to the Canvas. You must submit your assignment on time; otherwise, you will receive zero. In addition, you cannot submit your file more than one time.
e. There will be several folders on the Canvas. You need to upload your file(s) using the correct folder on the Canvas.
f. Name each file: "Assignment Number(Question number(s))".
g. To upload your file(s):
   - In Course Navigation, click the Assignments link.
   - Click the title of the assignment.
   - Click the **Submit** Assignment button.
   - Add **File**. ...
   - Add Another **File**. ...
   - **Submit** Assignment. ...
   - View **Submission**.

It is your responsibility to make sure that each file is uploaded correctly. If you uploaded a wrong file, you receive zero; files will not be accepted after due date even if you have a prove that the file is created before the due date.

Make sure you review the Cheating & Plagiarism policy on Canvas.

1. (5 points)

a. What are the differences between machine languages and high-level languages?
b. What is an object file?
c. What is linking?
d. What kind of errors are reported by a compiler?
e. What actions must be taken before a variable can be used in a program?

2. (3 points)

Which of the following are valid C++ identifiers?

```
a. new-Assignment    b. _nextQuiz    c. 3rdProject
d. $twoHundred    e. CPP_Project    f. OneInchIs2.2Centimeters
g. Weekly Quiz    h. Jack'sHomework    i. first#
j. overPayment
```

3. (4 points)

If `int x = 3;`, `int y = 18;`, `double z = 9.5;`, and `double w = 3.5;`, evaluate each of the following statements, if possible. If it is not possible, state the reason.

```
a. (x + y) % y    b. x % y - w    c. (y + z) / w    d. x * z % y + w
e. (x % y) * z    f. (x * y % z) - w    g. x % (y + z)
h. (x % y + z) / w
```

4. (4.5 points)

Evaluate the following expressions.

```
a. 28 - 3 + 6    b. 6 / 5    c. 3 * 6 / 2 - 15    d. 4 - 6 % 11
e. 37 / 4.0    f. 15 + 18 % 2 - 20 / 6    g. 32 % 12 + 6 - 36 / 5 * 8
h. 5 / 9 * (32.6 - 4.5)    i. 18.0 + 5.0 * 3.0 /4.0
```

5. (2.5 points)

Suppose x, y, and z are `int` variables and w and t are `double` variables. What value is assigned to each of these variables after the last statement executes?

```
x = 38;
y = x - 10;
x = 2 * x + y - 3;
z = y % (x + 2);
w = 3.0 * y + z + 6.5 - 7 % 3;
t = x / 4.0 + 17 / 4 - y % 4;
```

6. (6 points)

Suppose a and b are `int` variables, c is a `double` variable, and a = 32, b = 16, and c = 4.5. What is the output of the following statements?

a. `cout << a - b * c << endl;`
b. `cout << a / 2 - c << endl;`
c. `cout << a / static_cast<double>(b) + 3.5 * c << endl;`
d. `cout << 62 % 28 + 6.3 + a / (c + 0.5) << endl;`
e. `cout << 5 - static_cast<int>(c) % 3 + a - b << endl;`
f. `cout << 22.5 / 2 + 14.0 * 3.5 + 28 << endl;`

7. (4.5 points)

Suppose a, b, and c are `int` variables and a = 5 and b = 6. What value is assigned to each variable after each statement executes? If a variable is undefined at a particular statement, report `UND` (undefined).

	a	b	c
`a = (b++) + 3;`	___	___	___
`c = 2 * a + (++b);`	___	___	___
`b = 2 * (++c) - (a++);`	___	___	___

Programming Questions

8. (8 points)

A milk carton can hold 3.78 liters of milk. Each morning, a dairy farm ships cartons of milk to a local grocery store. The cost of producing one liter of milk is $0.38, and the profit of each carton of milk is $0.27. Write a program that does the following:

a. Prompts the user to enter the total amount of milk produced in the morning.
b. Outputs the number of milk cartons needed to hold milk. (Round your answer to the nearest integer.)
c. Outputs the cost of producing milk.
d. Outputs the profit for producing milk.

9. (6 points)

Newton's law states that the force, F, between two bodies of masses M_1 and M_2 is given by:

$$F = k\left(\frac{M_1 M_2}{d^2}\right),$$

in which k is the gravitational constant and d is the distance between the bodies. The value of k is approximately 6.67×10^{-8} dyn. cm^2/g^2. Write a program that prompts the user to input the masses of the bodies and the distance between the bodies. The program then outputs the force between the bodies.

10. (5.5 points)

A piece of wire is to be bent in the form of a rectangle to put around a picture frame. The length of the picture frame is 1.5 times the width. Write a program that prompts the user to input the length of the wire and outputs the length and width of the picture frame.