Northeastern University
College of Engineering

Cornerstone of Engineering 1
Fall 2017

Objective: Practice data types and operators, input and output and formatting. Plan your programs using pseudocode/flowcharts and test and verify results. Write working C++ programs.

Homework Assignment 2 (C++). **Due Monday September 18th by the start of class.**

1. Read Chapters 1 and 2 in the Etter text. Review the C++ Videos on Fundamental Data Types, Operators, and Input/Output Format and Strings Videos 3,4,5. Please take the online quiz by class time Monday on the 18th found under assignments.

2. Develop a flowchart or pseudocode, also include solving the problem by hand and then write and execute complete programs to solve the following problems:

   1) Write a program to compute the area A of an ellipse with semiaxes a and b– test your program with the values a = 2.5 m and b = 4 m. Remember to include comments and have the user input the values for a and b. (recall $A = \pi ab$)

   2) The amino acids in proteins are composed of atoms of oxygen, carbon, nitrogen, sulfur and hydrogen as shown below for a few acids. See table below.

      a) Write a program that asks the user to enter the number of atoms of each of the five elements for an amino acid. Then have it compute and print the molecular weight for this amino acid. Note: Make sure the user input is very clear with helpful output. You do not need to identify which Amino Acid (a much more challenging problem), just output the molecular weight given the user input. Test this program for the Alanine and Arginine acids.

      b) Write a new program that asks the user to enter the number of atoms of each of the five elements for an amino acid. Then have it compute and print the average weight of the atoms for this amino acid. Test this program for the Cysteine and Lysine acids.

   Format your result to three decimal places.

   Amino Acid Molecules and (Atomic Weights)

Amino Acid	O (15.9994)	C(12.011)	N(14.00674)	S(32.066)	H(1.00794)
Alanine	2	3	1	0	7
Arginine	2	6	4	0	15
Cysteine	2	3	1	1	7
Lysine	2	6	2	0	15

Note: you will need to use C++ Math functions, so you will need to include the math library. Also, remember to set PI as a constant, not a variable.

Please upload to blackboard by the due date the report containing the following.

Title Page. Make a Cover page for this assignment. On the top half, place the standard information: Assignment title, course number and course name, lecture day and meeting time, date (due), and your name. On the bottom half of the page, provide an organized list of contents. With any extra space feel free to include a picture –be creative you are an aspiring engineer!

The body of the report should contain for each problem a copy of your pseudocode or flowchart, the test by hand calculation, your program source code .cpp file and a screen shot of your programming window showing all program sample runs with the output. There is no memo required for this assignment.

Flow Chart Symbols

Start / Stop

Assignment

Decision

Input

Direction of flow

Output

Connector