

CSCI165 Computer Science II

Module 1 Assignment

Solve the following problems. Answers should be stored in a document called **<last name>_module1_assignment**

My file would be called **Whitener_module1_assignment**

Save the document in the **module-1 repository**. When you push your changes I will be able to grab your work.

For problems 1 – 6: Answer the questions in a new document. I am not asking you to write code. I am asking to describe an algorithm; but I am looking for a **detailed explanation**

For Problems 7 – 8: Insert an image of the UML diagrams into the same document

For Problem 10: Create the Java source file in the module-1 repository and add a screen shot of you compiling and running the program from the terminal into your document.

1. **Puzzle Problem:** Suppose your little sister asks you to show her how to use a pocket calculator so that she can calculate her homework average in her science course. Describe an algorithm that she can use to find the average of 10 homework grades.
2. **Puzzle Problem:** A Caesar cipher is a secret code in which each letter of the alphabet is shifted by N letters to the right, with the letters at the end of the alphabet wrapping around to the beginning. For example, if N is 1, when we shift each letter to the right, the word daze would be written as ebaf. Note that the z has wrapped around to the beginning of the alphabet. Describe an algorithm that can be used to create a Caesar encoded message with a shift of 5.
3. **Puzzle Problem:** Suppose you received the message, “sxccohv duh ixq,” which you know to be a Caesar cipher. Figure out what it says and then describe an algorithm that will always find what the message said regardless of the size of the shift that was used.
4. **Puzzle Problem:** Suppose you’re talking to your little brother on the phone and he wants you to calculate his homework average. All you have to work with is a piece of chalk and a very small chalkboard—big enough to write one four-digit number. What’s more, although your little brother knows how to read numbers, he doesn’t know how to count very well so he can’t tell you how many grades there are. All he can do is read the numbers to you. Describe an algorithm that will calculate the correct average under these conditions.
5. **Determine the Output:** Suppose N is 15. What numbers would be output by the following pseudocode algorithm?

```
0 => Print N.  
1 => If N equals 1, stop.  
2 => If N is even, divide it by 2.  
3 => If N is odd , triple it and add 1.  
4 => Go to step 0.
```

6. **Determine the Output:** Suppose N is 6. What would be output by the algorithm in that case?

Draw.io is the best option for creating UML diagrams. Be sure to export the diagram as an image

<https://about.draw.io/uml-class-diagrams-in-draw-io/>

8. Draw a UML class diagram representing the following class:
 1. The name of the class is Circle.
 2. It has one attribute, a radius that is represented by a double value.
 3. It has one operation, calculateArea(), which returns a double.
 4. Its attributes should be designated as private and its method as public
9. To represent a triangle we need attributes for each of its three sides and operations to create a triangle, calculate its area, and calculate its perimeter. Draw a UML diagram to represent this triangle.
10. **Write a Java program:** To print the following shapes one after another heading down the page. Impress me by using loops if you'd like. You won't get any extra points but boy I'll be impressed.

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