

Michael Haupt
Lab One

Task One – show in terminal the java version

```
michael@pop-os:~$ java -version
java version "13.0.2" 2020-01-14
Java(TM) SE Runtime Environment (build 13.0.2+8)
Java HotSpot(TM) 64-Bit Server VM (build 13.0.2+8, mixed mode, sharing)
michael@pop-os:~$
```

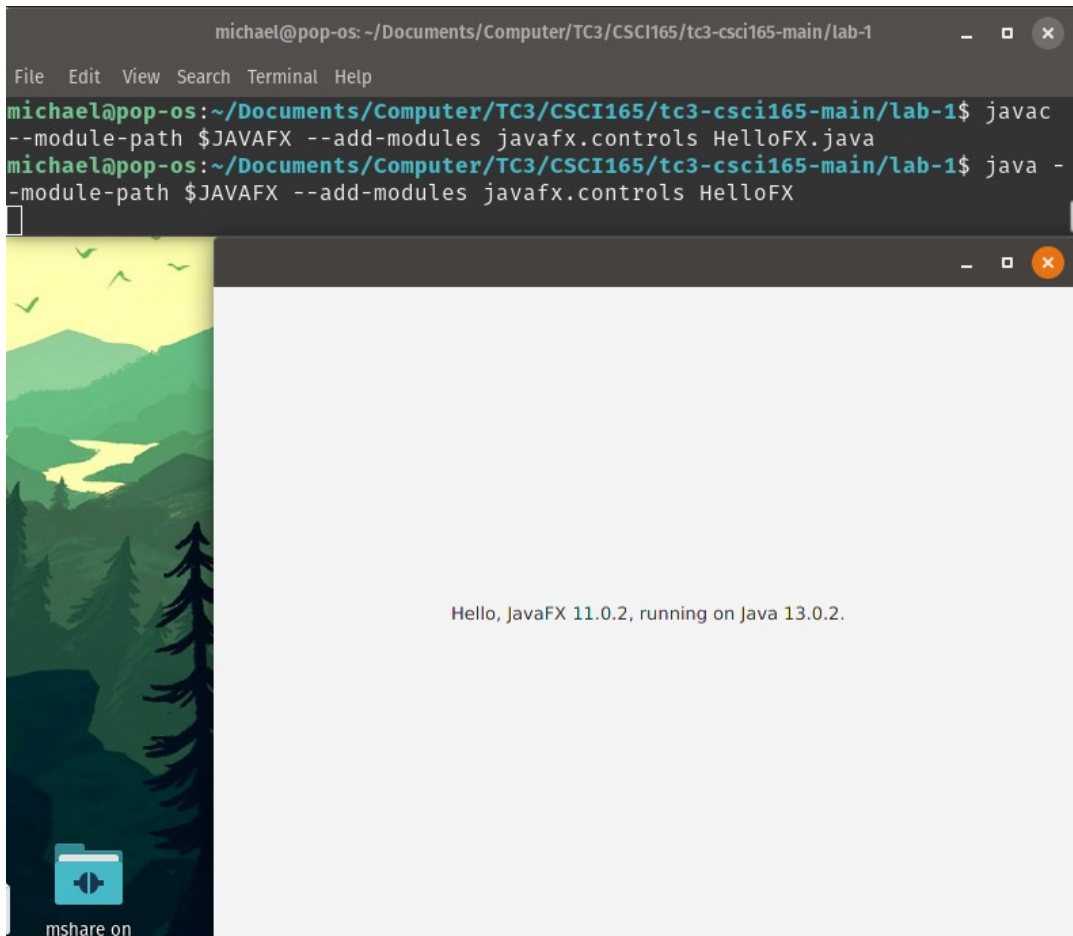
Task Two – show in terminal the java home path

```
michael@pop-os:~$ echo $JAVA_HOME
/opt/jdk-13.0.2_linux-x64_bin/jdk-13.0.2
michael@pop-os:~$
```

Task Three – show in terminal the javafx path

```
michael@pop-os:~$ echo $JAVAFX
/opt/openjfx-11.0.2_linux-x64_bin-sdk/javafx-sdk-11.0.2/lib
michael@pop-os:~$
```

Task Four – show that javafx is working



Task Five – show the java program running

```
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$ ls
Haupt_LabOne.odt  HelloWorld.java
HelloFX.class     Java_Overview.pdf
HelloFX.java      LAB-InstallConfigureJava.pdf
HelloWorld.class  ReadMe.txt
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$ javac HelloWorld.java
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$ java HelloWorld
Hello World!
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$
```

Task Six – HelloWorld2

```
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$ javac HelloWorld2.java
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$ java HelloWorld2 Michael Haupt
Hello Michael Haupt. Nice work processing the arguments!
michael@pop-os:~/Documents/Computer/TC3/CSCI165/tc3-csci165-main/lab-1$
```

Additional Problems

For problems 1 – 6: Answer the questions in the word processor 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 lab-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.

1. Press ON button
2. Clear input stream by pressing the clear button
3. Enter the first number
4. For the remaining numbers, repeat steps in the loop
 - 4a. Press “+” button
 - 4b. Press number
5. Press the “=” button to get the sum of the numbers
6. Press “/” button to divide the answer by the total number of grades
7. Enter the number that corresponds with the total number of grades – in this case 10
8. Press “=” to get the final result.

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.

1. Create an array containing the alphabet in lower case in alphabetical order. ‘a’ would be in position 0, ‘z’ would be in position 25.
2. Create a string that has the message that you want to encode – var secretMessage and convert to all lower case.
3. Create an integer variable N, and set N to be number that you want to shift the numbers to the right – in this case the number is 5
4. Create a string variable to hold the new encoded message – var encodedMessage.
5. Create a for loop to iterate through the string secretMessage, var ‘i’ will be used to track iterations. The loop should run as long as the number of iterations $i < \text{length}(\text{secretMessage})$. The following instructions happen inside the loop.
 - 5a. Slice character from string secretMessage, position i and save to var slicedChar.

5b. Used another for loop to iterate through the alphabet array(iterate loop with j), comparing to see which char matches the sliced character 'slicedChar'. If the sliced char was 'b', then j would be position '1'.

5c. Append to string encodedMessage.append[i] = alphabetArray[j+N] – adding N will get you a letter 5 positions 'to the right'. There will need to be an if statement that if $j+N > 25$ then use $j+N - 26$. In this case, if we started with 'z' (position 25), then $25 + 5 - 26$ would give us position 4 or 'e'.

6. Print the var encodedMessage

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.

There are 26 letters in the alphabet and we are already using 1. Since the shift is happening uniformly across all letters, there are a total of 25 shifts possible with every encoded message.

To solve the code, all we need to do is print out all 25 possibilities.

1. Create an array containing the alphabet in lower case in alphabetical order. 'a' would be in position 0, 'z' would be in position 25.
2. Create a string that has the message that you want to decode – var codedMessage and convert to all lower case.
3. Use a for loop to iterate through all 25 possibilities. For example with iteration 1, shift all letters by 1 and print them out. Same for iteration 2 through 25.

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.

Well, if you happened to know the Sumerian base 60 numeral system called Sexagesimal, then you could do the following:

- use position 1,2 to count up total points earned by the little bro up to 3600
- use position 3,4 to count up total points for the class up to 3600

Divide the amount of points earned by total class points.

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.

15 46 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1

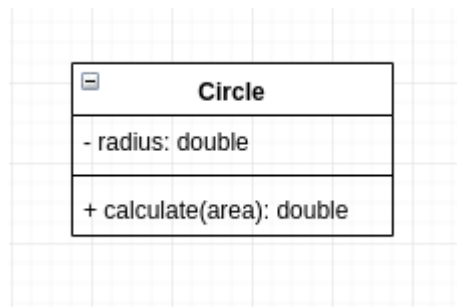
6. Determine the Output: Suppose N is 6. What would be output by the algorithm in that case?

6 3 10 5 16 8 4 2 1

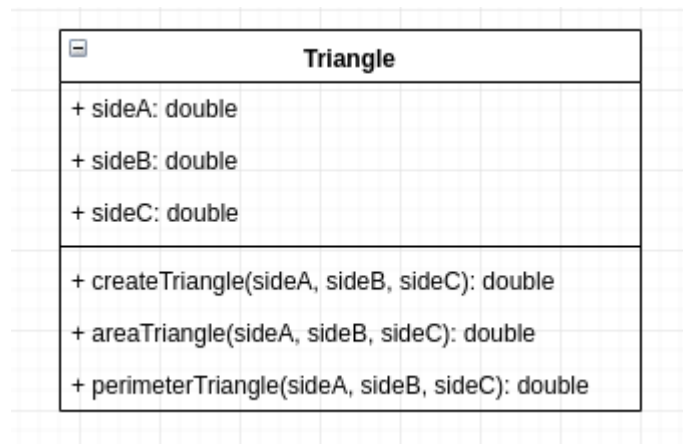
<https://about.draw.io/uml-class-diagrams-in-draw-io/>

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. You won't get any extra points but boy I'll be impressed.

```
for (int i = 5; i > 0; i--){
    for (int j = 1; j <= i; j++){
        System.out.printf("*");
    }
    System.out.println("");
}
```

```
for (int i = 5; i > 0; i--){
    if(i == 5 || i == 1){
        System.out.println("*****");
    } else {
        System.out.println("*  *");
    }
}
```

```
for (int i = 5; i > 0; i--){
    if(i % 5 == 0){
        System.out.println("*****");
    } else if (i % 2 == 0) {
        System.out.println(" *** ");
    } else if (i % 3 == 0) {
        System.out.println(" ** ");
    } else if (i == 1) {
        System.out.println("*****");
    }
}
```