

CS102 – Algorithms and Programming II
Lab Programming Assignment 1
Fall 2022

ATTENTION:

- Compress all of the Java program source files (.java) files into a single zip file.
- The name of the zip file should follow the below convention:
CS102_Sec1_Asgn1_YourSurname_YourName.zip
- Replace the variables “YourSurname” and “YourName” with your actual surname and name.
- You may ask questions on Moodle.
- Upload the above zip file to Moodle by the deadline (if not significant points will be taken off). You will get a chance to update and improve your solution by consulting to the TA during the lab. You will resubmit your code once you demo your work to the TA.

GRADING WARNING:

- Please read the grading criteria provided on Moodle. The work must be done individually. Code sharing is strictly forbidden. We are using sophisticated tools to check the code similarities. The Honor Code specifies what you can and cannot do. Breaking the rules will result in disciplinary action.

Math Problem Solver

You are going to implement a Java program for solving specific types of mathematical problems, without using any methods of the Math class. You may need to use some mathematical operations such as finding the Greatest Common Divisor, in this case, you should research how these operations work mathematically and implement your own methods for calculating them.

The problems to solve are going to use the following templates:

- 1) Around a rectangular flowerbed with dimensions **X** meters and **Y** meters are to be planted roses equally spaced so that the roses are found in every corner of the flowerbed and consumed as little as possible. At what distance are planted roses?
- 2) Find whole numbers between **A** and **B** that are divisible by **X**, **Y**, and **Z**.
- 3) Louise is **X** years old. Her daughter is **Y** years old. In how many years will Louise be double her daughter's age?

Implement a menu-driven console application where the user first chooses the problem type, then inputs the problem variables (**A**, **B**, **X**, **Y**, **Z**, etc.) to print out the result and the steps of the solution.

Include an option in your menu to generate 5 random questions from the 3 problem templates you have and export a text file with the questions and their solutions. For each question to generate, you should first choose the question type from the templates, then replace the unknowns of the question with suitable random numbers. The resulting combination should have a correct answer, so any random combination may be unsolvable. The output text file should contain the number of the question, followed by the question itself and its solution. Allow the user to enter the name of the text file to generate.

Preliminary Submission: You will submit an early version of your solution before the lab. This version should at least include the following:

- Method for solving one problem template.
- Displaying the menu and getting the user's choice.

You will have time to complete your solution in the lab. Do not forget to make your final submission at the end. Even if you finish the assignment in the preliminary submission, you should submit for the final submission on Moodle.

Not completing the preliminary submission on time results in 50% reduction of this assignment's final grade.