

COMP1236 Group Project – Fall 2024

Use Git Bash for the completion of this project. To achieve the basic functionality of the application you are required to **use only the programming constructs taught in class.**

Develop a shell scripting application that allows the user to perform these three tasks:

- Task 1: The program should find all the triangular numbers that are within a range specified by the user and print them. For example, if the user chooses to print such numbers in the [1, 40] range, the program should print 1, 3, 6, 10, 15, 21, 28, 36. The program should print next to each triangle number if it is odd or even and also give two separate counts of how many odd and even triangle numbers were found. In addition, the program should find and print two products: 1) the product of all the odd triangular numbers and 2) the products of the even triangular numbers found within the range given.
- Task 2: Find all the numbers that can be written as the product of two natural numbers in succession and print them in increasing order. The calculations should start from an initial value chosen by the user (For example, if the user decides to start from 5, the first number that should be in your output is 30 as $5 \cdot 6 = 30$, where 5 and 6 are two natural numbers in succession). The user should specify how many such numbers they want to print. For each number found the program should also check/state whether the number found is a factor of a positive integer x , where x is another input specified by the user.
- Task 3: Find the terms of a sequence given by the rule $\text{Term} = an^3 + bn + c$, where a , b and c are non-negative integers specified by the user and n is a natural number. This task should print a limited amount of numbers in the sequence. The user should specify the range of the numbers to be printed $[n_1, n_2]$, where n_1 represent the position of the first term, and n_2 represents the position of the last term the user chooses to print (for example, if the user chooses $a=1$, $b=2$ and $c=0$ in the range [2,4] the program should print: 12, 33, 72). In addition, the program should print the product of the first and the last number printed (in the example given this will be 864 since $864=12 \cdot 72$). Next to the product the program should print whether the product is a multiple of number 4.

Your application should be user friendly. First, you should ask the user to enter a password. The password is App1 and should be case sensitive. The user should be allowed three choices to enter the correct password. If the user enters the correct password, your program should display a menu with 3 options only, corresponding to the list of operations this application offers (the three tasks).

In your menu design, if the user enters A or a, the application should offer to work with triangular numbers as required by Task 1.

If the user enters B or b, the program should offer to work with the numbers that can be written as product of two numbers in succession, following the instructions given in Task 2.

If the user enters C or c, the application should offer to work with sequences, as required by Task 3.

If the user enters an incorrect choice, the menu should be redisplayed with a warning message, indicating the issue. This should continue until the user enters the correct choice.

After the user enters a correct choice, the program should display the user's selection before printing the output. After a task has been completed, the user should be given the option to select to continue with another task, or to exit. If the user chooses to continue with another task, the menu should be redisplayed. This process should continue in this manner until the user decides to exit

Before writing the code, you should work on the problem-solving part of the application development process. Draw the flowcharts for each of the tasks separately. You also need to submit the main flowchart which will show the logic of your entire application.

Check the next page for the rubric and submission guidelines.

Marks: 20% of course grade

Task	Possible marks	Description
Problem Solving - Flowcharts	15	The flowchart shows the logic of your program correctly
Application Menu Interaction	10	The application menu displays correctly. This includes each task's interaction with the user while getting the input
Task 1 Functionality	15	The application finds and displays the required triangular numbers correctly
Task 2 Functionality	15	The application finds and displays the required sequence of numbers correctly
Task 3 Functionality	15	The application finds and displays the required numbers correctly
Adherence to program requirements	20	Application logic and the requirements are met.
Code Documentation and Conventions	10	Comments are entered appropriately, and best conventions discussed in class are followed.

Submission guideliness:

Complete this project by Friday, 6th of December.

You should submit a zip file named **Group_No_Project.zip** which contains three files:

A single pdf file which contains the flowchart(s) named: **Group_No_Flowchart.pdf**

A single .sh file which contains your code named: **Group_No_Application.sh**

A single document where you have indicated the software used for completion of your tasks and how the work was distributed amongst team members.