Software system design and Analysis

Assignment 2

Task 1:Matrix Algebra (70)

In C++ programming language write an OOP program that allows to:

- store matrices n by m (create a necessary class);
- input / output from **input.txt** and **output.txt**;
- assign one matrix to another (overload = operator);
- add two matrices A and B (overload the + operator, prints the error message);
- subtract two matrices A and B (overload the - operator, prints the error message if needed);
- multiply two matrices A and B (overload the * operator, prints the error message if needed);
- transpose matrix.

Input format (look at the examles)

The input contains, in the same order:

- The sizes of an A matrix in 2 different rows. Then in a new line the values of the elements A.
- The sizes of a B matrix in 2 different rows. Then in a new line the values of the elements B.
- The sizes of a C matrix in 2 different rows. Then in a new line the values of the elements C.

We are working under the assumption of the correctness of the input data.

Output format (look at the examles)

Your output has to contain, in the same order:

- D = A+B
- E = B-A
- F = C*A
- G = AT

Notes

- The data type is Integer.
- There **SHOULD** be a new line at the end of the output.

You need to print the matrix in element-wise manner row by row. The splitter of the elements is a space. You do not need to print spaces at the ends of the rows. The format of the error message is "Error: the dimensional problem occurred" without quotes.

Sample 1

Input	Output
2 3 1 2 3 4 5 6 2 3 4 5 6 7 8 9 2 2 1 4 5 7	5 7 9 11 13 15 3 3 3 3 3 3 17 22 27 33 45 57 1 4 2 5 3 6

Sample 2

Input	Output
2 2 1 2 4 5 2 3 4 5 6 7 8 9 2 2 1 4 5 7	Error: the dimensional problem occurred Error: the dimensional problem occurred 17 22 33 45 1 4 2 5

Task 2: The Emperor and Happiness (30)

You are the emperor of a medieval empire, and tomorrow is your crowning ceremony. The event is the most significant gathering you have ever thrown.

You want people to be happy, so you ordered **N magical happiness potion flagons (containers).** However, **one** of the **N** magical happiness potion flagons you had planned to open for the ceremony has been found to be **poisonous**.

Before death, the toxin shows no signs. Even **the smallest amount of that poison** consumed causes **death** within **20 - 40 hours** .

You have just **under 48 hours** to identify the poisoned flagon . Your celebration would be ruined if any more people were slaughtered; you have some **capitally punished inmates** (going to be executed), that you can make drink from these flagons.

Write a function to calculate **the bare minimum count** of **Capitally punished inmates** you need to risk their lives for the purpose of accurately and definitely determining the **poisonous** flagon within the 48 hours limit. (20) marks
Explain your algorithm with 1-2 comments in the code. (10) marks

$$0 <= N <= 1.83 * 10^{19}$$

Input and output are **a single integer**, examples:

Input	Output
0	0
1	0
4	2
5	3
6	3

#gametheory #numbertheory

Submission

To submit your solution, you are required to upload your code to CodeTest, a comprehensive platform that streamlines the task of grading programming assignments and detecting plagiarism. With CodeTest, you can be assured of an accurate and fair evaluation of your work, so you can focus on demonstrating your best efforts.

Deadline: 24.02.2023 23:59:00

Grading Criteria

The assignment will be graded on the following criteria:

1. Successful completion of every test case is mandatory, failure to do so will result in a score of ZERO.
2. The code will be evaluated based on the specific requirements set out in the problem statement and a grading rubric. For instance, if the problem requires the use of pointers and your code does not implement them, you will receive a score of ZERO.
3. Any form of plagiarism or cheating will result in an automatic score of ZERO and consequences as per the academic policies.
4. The late policy will be strictly enforced and will result in penalties as follows:
    a. submissions received after the deadline, even by a single minute, will result in a reduction of 50% of the total grade.
    b. Submissions received more than 12 hours past the deadline will receive a score of ZERO.
5. Unclean code and/or incorrect grammar, will result in up to -5% of the whole assignment.
6. Impolite or offensive naming of the variables, methods, comments, etc.. can result in a score of ZERO, similar repeated actions could be reported to the DOE.

It is important to keep these evaluation parameters in mind while completing the assignment, as they will determine your final score and success in the course.

Good Luck!