2022 NORTHERN INDIANA HIGH SCHOOL CODING COMPETITION

April 23, 2022

COMPUTER SCIENCE AND INFORMATICS
COLLEGE OF LIBERAL ARTS AND SCIENCES
INDIANA UNIVERSITY SOUTH BEND

Round Two

Problem 1. **Calendar Display**

Given a number of days in a month and a starting day (0 for Sunday, 1 for Monday, etc.), write a program to display the calendar for that month.

Note: (1) Weekday titles (**S** for Sunday, **M** for Monday, **T** for Tuesday, **W** for Wednesday, **T** for Thursday, **F** for Friday, and **S** for Saturday) should be printed at the top; (2) There should be spaces between two days.

The input line has two numbers separated by a white space. The first number is the number of days (28-31) in this month. The second number is the starting day (0 for Sunday, 1 for Monday, 2 for Tuesday, 3 for Wednesday, 4 for Thursday, 5 for Friday, and 6 for Saturday). The output is the calendar of the month.

Sample input (red color) and output (blue color):

Input: 30 2

Output:
```
S   M   T   W   T   F   S
        1   2   3   4   5
6   7   8   9   10  11  12
13  14  15  16  17  18  19
20  21  22  23  24  25  26
27  28  29  30
```

Input: 29 5

Output:
```
S   M   T   W   T   F   S
                    1   2
3   4   5   6   7   8   9
10  11  12  13  14  15  16
17  18  19  20  21  22  23
24  25  26  27  28  29
```

Problem 2. Designated Volunteer

Given a list of names, representing students in a class, you need to write a program similar to "Eeny, Meeny, Miny, Mo" to select a volunteer to ask the teacher for an extension on a homework assignment. The method works the following way: placing the students in a circle, we count starting from the first student for a given number of steps. The student that the count ends on is eliminated. The count restarts from the one following them and continues this way until a single student is left. This last student is the designated volunteer.

For example, if the students are A B C D E F and the count is 8, we start counting with 1 from A. We reach 6 at F, and since the names are in a circle, we restart from A with 7, and land on B with 8. Thus, B is eliminated. Then we restart from C with 1, landing at E for 8. E is eliminated and we restart the count from F with 1. Then D is eliminated, followed by A and then F. Finally, C is left at the end, making it the volunteer.

The input of your program consists of two lines. The first line contains two integer numbers separated by a space, one for the number of students, which is greater than or equal to 1 and less than 30, and a second one for the count, which is also greater than or equal to 1 and less than 30. The second line contains all the names of students, each is a single word separated by a single white space.

The output of your program should be the name of the remaining volunteer.

Sample input (red color) and output (blue color):

Input:
6 8
A B C D E F

Output:
C

Input:
1 3
Bob

Output:
Bob

Input:
6 5
Bob Jim Pam Ann Sam Tom

Output:
Bob

Problem 3. Plagiarism Detection

One approach in text plagiarism detection is to identify similarities of two or more documents. A sophisticated approach involves building detection model, selecting similarity criteria, examining suspicious documents, and singling out documents similar to a degree above a chosen threshold.

In this problem, you are going to write a program to simulate a group text plagiarism detection algorithm. To simplify the problem, we set the group size **3**, and furthermore we use **three** strings to represent three text documents.

Input of your program has **three** lines representing contents of three documents. Each line contains a string (less than 100 characters). Output is the **length** of the **longest common substring** among three documents. Suppose the three input lines are "Wel**come** to South Bend!", "I have be**come** a programmer.", and "We will have a strong **come**back.", the output should be **4**, because the longest common substring among them is "**come**", which has 4 characters.

Sample input (red color) and output (blue color):

Input:
This is my own work.
This is not my work.
I did it myself in New York City.
Output:
3
Explanation: The longest common substrings are "ork" and " my" (' ', 'm', 'y'), both have 3 characters.

Input:
abcdefghij
ABCDEFGHIJ
1234567890
Output:
0
Explanation: There is no common substring among three documents. So, its length is 0.

Input:
Java is an object-oriented programming language.
C is a structured programming language used years ago.
SQL is a kind of "programming language for end users".
Output:
20
Explanation: The longest common substring is "programming language" with 20 characters.