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 “Welcome to South Bend!”,” “I have become a programmer.”, and “We will have a strong comeback.”, 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.