WEEK#1 - ASSIGNMENT 2

MS Connect

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Objectives

- Get comfortable with .NET.
- Start thinking more carefully.
- Solve problems in C# using built in libraries and advanced concepts.

Reasonable

1. Communicating with colleagues about problem problems in English (or some other spoken language).
2. Discussing the assignment material with others in order to understand it better.
3. Helping a colleagues identify a bug in his or her code, as by viewing, compiling, or running his or her code, even on your own computer.
4. Incorporating snippets of code that you find online or elsewhere into your own code, provided that those snippets are not themselves solutions to assigned problems and that you cite the snippets' origins.
5. Sending or showing code that you've written to someone, possibly a colleagues, so that he or she might help you identify and fix a bug.

Deliverables

- Document your solutions in word file.
- Write proper comments for each line in your source code.
- Document the output of your program.
- Your program should address the problem, there should NOT be any deviations in output.

SECTION – A

① The problem statement is very easy. Given a number n you have to determine the largest power of m, not necessarily prime, that divides n!.

Input

The input consists of several test cases. The first line is the number of cases to handle. The following lines are the cases each of which contains two integers m (1 < m < 5000) and n (0 < n < 10000). The integers are separated by a space. There will be no invalid cases given and there are not more that 500 test cases.

Output

For each case in the input, print the case number and result in separate lines. The result is either an integer if m divides n! or a line 'Impossible to divide' (without the quotes). Check the sample input and output format.

Sample Input

```
2

2 10

2 100
```

Sample Output

```
Case 1: 8

Case 2: 97
```

② A palindrome is a string that reads the same from the left as it does from the right. Given two strings A and B, you need to find the length of longest palindrome which is a subsequence of both A and B.
A subsequence is a sequence obtained by deleting zero or more characters from a string.

For example, say, A = "cfcfaafc", B = "efagfc". Then the longest palindrome which is a subsequence of both A and B is "faf". So the answer is 3.

Input

First line of the input contains a positive integer T (T ≤ 100). Each of the following T cases consists of 2 lines. These 2 lines contain the strings A and B, respectively. Length of A and B will not be more than 60. All these strings contain only lowercase letters ('a' -'z'). No empty strings will appear in the input.

Output

For each case, print a line of the form 'Case < x >: < y >', where x is the case number and y is the length of the longest common palindromic subsequence.

Sample Input

```
3
cfcfaafc
efagfc
afbcdfca
bcadfcgyfka
palin
drome
```

Sample Output

```
Case 1: 3
Case 2: 5
Case 3: 0
```

③ Nikhil is going back home after a party. Currently he is standing on a bus station and waiting for a bus to arrive. There is a timetable of arriving buses near the station. Beside this, Nikhil also knows the amount of time that is needed to travel with specific bus. As he has only one ticket, there are no possibilities to change the bus somewhere in the middle of a trip in order to make it shorter. Can you help Nikhil to calculate minimal time that he needs to get home?

Input

There is a number of tests T (T ≤ 100) on the first line. Each test case contains the number of buses K (1 ≤ K ≤ 100) and current time (in format 'HH:MM'. Each of the next K lines contain arrival time of the bus (in the same format as current time) and travelling time 0 ≤ Q ≤ 1000 needed for John to get home (in minutes). Refer to the sample input as an example.

Output

For each test case output a single line 'Case T: N'. Where T is the test case number (starting from 1) and N minimal time (in minutes) needed for Nikhil to go back home.

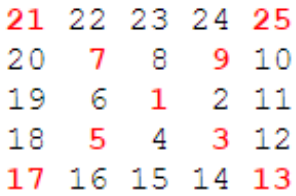
Sample Input

```
2
1 18:00
19:30 30
2 18:00
19:00 100
20:00 30
```

Sample Output

```
Case 1: 120
Case 2: 150
```

④ Starting with the number 1 and moving to the right in a clockwise direction a 5 by 5 spiral is formed as follows:



It can be verified that the sum of the numbers on the diagonals is 101.

What is the sum of the numbers on the diagonals in a 1001 by 1001 spiral formed in the same way?

⑤ You must write a program that encrypts an input into a string of characters. For every character i in the input up to the second to last character, take the i and i+1 characters and encode them by writing the letters of the alphabet, in order, that range in the same direction between those chosen characters.

For example: if the original string were bo then it would be encoded as cdefghijklmn, but if the string were boa then bo is encoded as cdefghijklmn and oa is encoded as nmlkjihgfedcb with the final encrypted string being cdefghijklmnnmlkjihgfedcb.

If the original string contain zero letters between two chosen characters, such as the string ab then you should encrypt it as aRb with R standing for what direction in the alphabet to go in determining the original characters. The encrypted string aRb represents ab but the encrypted string aLb represents ba (R = right, L = left).

If two chosen characters in the original string are the same, such as the string tt, then you should encrypt it as tZt with Z standing for zero letters in between.

Examples

Input: att

Output: bcdefghijklmnopqrstZt

Input: brep

Output: cdefghijklmnopqqponmlkjihgffghijklmno

Input: Optimizer

Output: oRpqrssrqponmlkjjkllkjjklmnopqrstuvwxyyxwvutsrqponmlkjihgffghijklmnopq

⑥ Given an input of a 2 dimensional array of integers, rotate the array 90 degrees clockwise.It should work for rectangular arrays of all sizes and proportions.
The rotated array should be printed at the end of the program.

Example

Input:

```
[[0,1,2,3,4,5],
 [6,7,8,9,0,1],
 [2,3,4,5,6,7],
 [8,9,0,1,2,3]]
```

Output:

```
[[8,2,6,0],
 [9,3,7,1],
 [0,4,8,2],
 [1,5,9,3],
 [2,6,0,4],
 [3,7,1,5]]
```

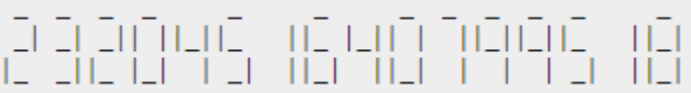
Do not rely on the patterns in the arrays above, they were used just for explanation purposes. Expect the arrays to be randomly generated.

⑦ Given two arbitrary numbers A,B. Print number B as a Digital LED Pattern where A is the scale.

Input:

```
1 2320451640799518
```

Output:



Input:

```
2 23
```

Output:

SECTION – B

① Create C# program demonstrates Windows Service- Service should read data from a text file - use file watcher and store it in an output XML file. Prepare your data schema in source (text) and destination files (XML).

② Create C# program demonstrates Producer / Consumer Problem - – multiple source folders and single destination folder (multiple input & output). Read the input files from source location using individual thread (one thread for one source location) and write the processed file (XML) in destination folder. This should be a windows service and provide a way to configure the source and destination locations in app.config or similar configuration.

③ Create C# program demonstrates Producer / Consumer Problem - there will be – multiple source folders and single MSMQ (multiple input & msmq). Read the input files from source location using individual thread (one thread for one source location) and write the processed XML in a message queue (MSMQ). This should be a windows service and provide a way to configure the source and queue path locations in app.config or similar configuration.

④ Design and Implement a socket server using threads. - Write the server in windows Service & client in a console application.

Design the process commands –

- Login
- AddEmployee
- GetEmployee
- RemoveEmployee
- Quit

You can design your own commands and concept (like messenger, Students, Questions or Problems, Movies etc.)

Design the request header - first 2 or 4 bytes should be the API Command.

Server should store the processed records in text file or XML file

⑤ Write below C# programs

1. How do I save a stream to a file in C#?
2. You need to write data from a collection to a log file.

3. You need to read or write compressed data.
4. You need to modify the access control list of a file or directory in the computer.
5. You need to react when a file system change is detected in a specific path.
6. Get the total free space on a Drive.
7. Determine if a path is a directory or a file.
8. You need to add nodes to an XML document
9. You need to retrieve a specific node from an XMLDocument (both XPath and XMLDOM)
10. Read/Write XML without loading entire document.
11. Write a C# Program to demonstrate the use of XML Serialization.
12. Create XML Schema for one or more C# Classes. And generate classes from schema. (xsd tool)
13. Create C# program demonstrates threads in a array.
14. Create C# program demonstrates parameterized threads.
15. Create C# program demonstrates threadpool
16. Create C# program demonstrates inter-process communication.
17. Create C# program demonstrates deadlocks & locking mechanism.
18. Create C# program to demonstrate custom exception handler.
19. Create C# program to generate bitmap (or jpg) image on the fly from runtime.