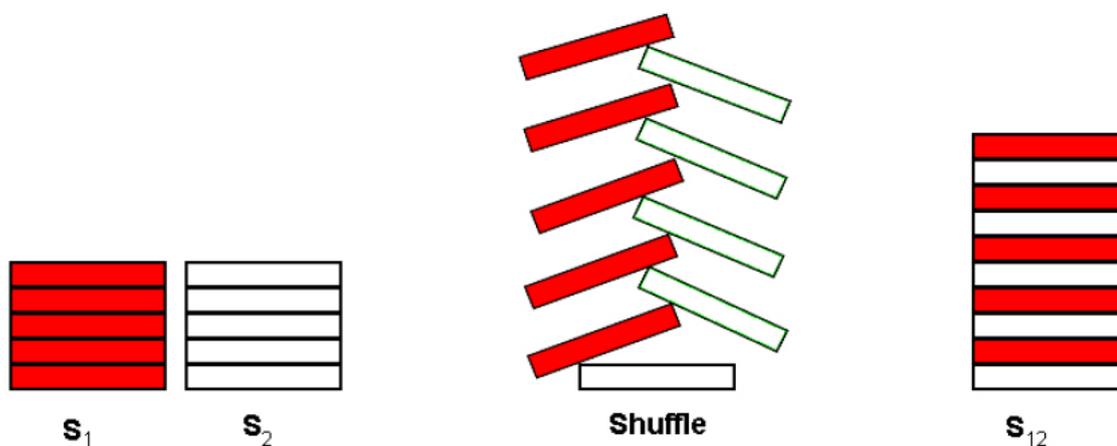


3418 Shuffle'm Up

A common pastime for poker players at a poker table is to shuffle stacks of chips. Shuffling chips is performed by starting with two stacks of poker chips, S_1 and S_2 , each stack containing C chips. Each stack may contain chips of several different colors.

The actual shuffle operation is performed by interleaving a chip from S_1 with a chip from S_2 as shown below for $C = 5$:



The single resultant stack, S_{12} , contains $2 * C$ chips. The bottommost chip of S_{12} is the bottommost chip from S_2 . On top of that chip, is the bottommost chip from S_1 . The interleaving process continues taking the 2nd chip from the bottom of S_2 and placing that on S_{12} , followed by the 2nd chip from the bottom of S_1 and so on until the topmost chip from S_1 is placed on top of S_{12} .

After the shuffle operation, S_{12} is split into 2 new stacks by taking the bottommost C chips from S_{12} to form a new S_1 and the topmost C chips from S_{12} to form a new S_2 . The shuffle operation may then be repeated to form a new S_{12} .

For this problem, you will write a program to determine if a particular resultant stack S_{12} can be formed by shuffling two stacks some number of times.

Input

The first line of input contains a single integer N , ($1 \leq N \leq 1000$) which is the number of datasets that follow.

Each dataset consists of four lines of input. The first line of a dataset specifies an integer C , ($1 \leq C \leq 100$) which is the number of chips in each initial stack (S_1 and S_2). The second line of each dataset specifies the colors of each of the C chips in stack S_1 , starting with the bottommost chip. The third line of each dataset specifies the colors of each of the C chips in stack S_2 starting with the bottommost chip. Colors are expressed as a single uppercase letter ('A' through 'H'). There are no blanks or separators between the chip colors. The fourth line of each dataset contains $2 * C$ uppercase letters, ('A' through 'H'), representing the colors of the desired result of the shuffling of S_1 and S_2 zero or more times.

The bottommost chip's color is specified first.

Output

Output for each dataset consists of a single line that displays the dataset number (1 through N), a space, and an integer value which is the *minimum* number of shuffle operations required to get the desired resultant stack. If the desired result can not be reached using the input for the dataset, display the value negative 1 (-1) for the number of shuffle operations.

Sample Input

```
2
4
AHAH
HAHA
HHAAAAHH
3
CDE
CDE
EEDDCC
```

Sample Output

```
1 2
2 -1
```