

# NWERC 2018

## Problem K Kleptography

John likes simple ciphers. He had been using the “Caesar” cipher to encrypt his diary until recently, when he learned a hard lesson about its strength by catching his sister Mary browsing through the diary without any problems.

Rapidly searching for an alternative, John found a solution: the famous “Autokey” cipher. He uses a version that takes the 26 lower-case letters ‘a’–‘z’ and internally translates them in alphabetical order to the numbers 0 to 25.

The encryption key  $k$  begins with a secret prefix of  $n$  letters. Each of the remaining letters of the key is copied from the letters of the plaintext  $a$ , so that  $k_{n+i} = a_i$  for  $i \geq 1$ . Encryption of the plaintext  $a$  to the ciphertext  $b$  follows the formula  $b_i = a_i + k_i \pmod{26}$ .

Mary is not easily discouraged. She was able to get a peek at the last  $n$  letters John typed into his diary on the family computer before he noticed her, quickly encrypted the text document with a click, and left. This could be her chance.

### Input

The input consists of:

- One line with two integers  $n$  and  $m$  ( $1 \leq n \leq 30$ ,  $n + 1 \leq m \leq 100$ ), where  $n$  is the length of the keyword as well as the number of letters Mary saw, and  $m$  is the length of the text.
- One line with  $n$  lower-case letters, the last  $n$  letters of the plaintext.
- One line with  $m$  lower-case letters, the whole ciphertext.

### Output

Output the plaintext of John’s diary.

#### Sample Input 1

```
5 16
again
pirpumsemoystoal
```

#### Sample Output 1

```
marywasnosyagain
```

#### Sample Input 2

```
1 12
d
fzvfkdocukfu
```

#### Sample Output 2

```
shortkeyword
```