

# Problem E

## Encryptastrophy

Time limit: 1 second

Alice and Bob are deeply in love, they sometimes like to swap out messages in class because they can't get enough of each other. In order to make sure no-one but them reads these messages, they get together and devise an encryption scheme that is theirs only: Despite what people are saying, security through obscurity *does* work, right?

To keep things simple, They first map every letter of the alphabet a-z to the numbers 0 to 25.

To encrypt and decrypt, a modular addition cipher is used, which defines the encryption function  $E$  and decryption function  $D$  as such:

$$E(k, p) = p + k \mod 26$$

$$D(k, c) = c - k \mod 26$$

$$c_i = E(k_i, p_i)$$

$$p_i = D(k_i, c_i)$$

Where  $p$  is the plaintext,  $c$  is the ciphertext and  $k$  is the key.

In order to avoid having to send long keys, they define the key as follows:

$$k_i = p_{i-1}$$

With  $k_0$  being predetermined by Bob and Alice.

They feel this is secure and chat away all day long, without a worry in the world.

Eve however, has devised a plan. While spying on them, she's always picked up the last letter of every message that they've sent. She's now bent on figuring out what these messages say.

### Input

- One line with one integer:  $1 \leq n \leq 10^3$ , the length of the ciphertext string
- One line with the ciphertext string
- One line with the last letter of the plaintext string

### Output

The plaintext string

#### Sample Input 1

```
8
ftzjzcmi
u
```

#### Sample Output 1

```
iloveyou
```

**Sample Input 2**

```
10
ulpwzkkfco
d
```

**Sample Output 2**

```
helloworld
```