# Problem 2. Vigenere Cipher

Time limit: 1 second
Memory limit: 256 megabytes

A Caesar cipher is a method of encrypting text. Given a message, the cipher generates a 'ciphertext' by shifting all the letters in the message by a given number. For example, if the string "DOG" were to be shifted by 2, then 'D' would become 'F', 'O' would become 'Q', and 'G' would become 'I' resulting in the string "FQI". If a shift goes past the end of the alphabet, it wraps around back to 'A'. For example, 'Z' shifted by 3 would become 'C'. Then, if one knows the shift amount, one can decrypt a ciphertext by simply shifting each letter the reverse direction.

A more advanced type of cipher is a Vigenere Cipher. In a Vigenere Cipher, in addition to the message, there is also a "key", which is another string of letters. Each letter in the key corresponds to a different shift amount, with 'A' corresponding to 0, 'B' corresponding to 1, and so on up to 'Z' which corresponds to 25. To encrypt a message using the key, we first concatenate the key onto itself until its length is equal to (or greater than) the length of the message. For example, if our message was "HELLOWORLD" and our key was "CMU", we would repeatedly add "CMU" onto itself until we got "CMUCMUCMUC". Then, we encrypt each letter in the message using a Caesar cipher with shift amount associated with the corresponding letter in the key. Using our previous example, the first letter of the message, 'H', will get encrypted with a shift of 2 since the first letter in the key, 'C', corresponds to a shift of 2. Likewise, the next letter 'E', will get encrypted with a shift of 12 since the next letter in the key, 'M', corresponds to a shift of 12. This continues for the entire message to get the final string "JQFNAQQDFF". To decrypt a vigenere cipher given the key, one only needs to decrypt each individual letter as they would decrypt a Caesar cipher, since the key tells them the shift amounts for each letter.

Your task is to write a program that can encrypt and decrypt a Vigenere Cipher.

## Input

The input consists of 3 lines. The first line contains a single character 'E' or 'D' corresponding to "Encrypt" and "Decrypt" respectively. The next line contains a non-empty string of length at most 1000 consisting only of the characters A-Z, representing the message or ciphertext. The last line contains another a non-empty string of length at most 1000 consisting only of the characters A-Z, representing the key.

## Output

Output a single line, the resulting string from the encryption or decryption.

## Examples

| standard input | standard output |
|---|---|
| E<br>HELLOWORLD<br>CMU | JQFNAQQDFF |
| D<br>JQFNAQQDFF<br>CMU | HELLOWORLD |
| E<br>ABCDE<br>A | ABCDE |