You and your best friend Dhruvi have taken the Cryptography course in your respective colleges. Dhruvi often boasts
yptography and puzzles, a heated debate starts between the two of you regarding who is better at solving puzzles. T
. You both agree to text via WhatsApp using the ciphertext generated by your ciphers, which means that Dhruvi will s
you will respond by sending your message as the ciphertext generated by your cipher. The challenge is that you will
fails to do so first loses the challenge.

Dhruvi's Cipher:

Conservative in her thought process, Dhruvi decides to teach you a lesson and since you hate history, she goes to Ch
se she gets a lot of good ciphers that can be difficult to solve in the short amount of time you have agreed to. The fol

"In cryptography, the ADFGVX cipher was a manually applied field cipher used by the Imperial German Army during V
telegraphy. ADFGVX was in fact an extension of an earlier cipher called ADFGX which was first used on 1 March 1918
on both the Western Front and Eastern Front."

She very well knows that you are quite good at solving standard puzzles so she decides to throw a curveball at you b
o the pre-existing algorithm, instead of naming the rows with the letters ADFGVX, she names them CRYPTO and the

image1

Given a key square (polybius square), keyword and plaintext message, encrypt the message using the modified ADFG

About the algorithm:

This algorithm is a product cipher of two ciphers: polybius square cipher and columnar transposition. The encrypting
n while the second phase is fractionating.

During the substitution phase, we substitute each letter with two letters retrieved from the polybius square (https://
After this, fill the enciphered text below the keyword in a matrix format left to right in a row and top to bottom fashic
in alphabetical order. (https://privacycanada.net/columnar-transposition-cipher/)
Now retrieve the text from the matrix column wise top to down to get the final ciphered text. Refer to the following l
yptography.com/ciphers/classical-era/adfgvx/
Input Format

The input consists of 3 lines where:

The first line consists of the keyword for columnar transposition
The second line consists of a permutation of the alphabets (in upper case) and digits. This should be used to fill the p
The third line consists of the plain text to encrypt
Constraints

The input string will consist of A-Z characters i.e.., English alphabets in upper case and 0-9 digits only. (Total 36 chara
You have to fill the empty spaces in the matrix during the columnar transposition step using the character 'X'. Which
with a certain permutation of the characters of the word 'CRYPTOGRAPHY'.
Output Format

Cipher text – String

Sample Input 0

CIPHER
J9I1E8D2Z6Y3M0C7K5LQOX4SFTUAGHNRWPBV
TEXTTOENCRYPT
Sample Output 0

TTCOTPPYOXHRGHXRRHRRCTORXPAAPX
Explanation 0

You have to fill the empty spaces in the matrix during the columnar transposition step using the character 'X'. Which
with a certain permutation of the characters of the word 'CRYPTOGRAPHY'.