**BACKGROUND**

A *XOR cipher* is an encryption method on which we take a text file, convert the bytes to ASCII, then XOR each byte with a given value, taken from a secret key. The advantage with the XOR function is that using the same encryption key on the cipher text, restores the plain text; for example, 65 XOR 42 = 107, then 107 XOR 42 = 65.

A common way to use a XOR cipher is with relatively long text and a relatively short key, on which case the key is repeated cyclically throughout the message:

‘apoquahgbabfp’ XOR ‘xyz’ =

‘a’ XOR ‘x’

‘p’ XOR ‘y’

‘o’ XOR ‘z’

‘q’ XOR ‘x’

‘u’ XOR ‘y’, ...

In this project, you are required to build a simple brute force **encryption-breaking logic in Python** that gets an **encrypted text** and a **key size** withoutthe key itself - and works to find the encryption key using a brute-force lookup.

1. Write a function **xor\_decrypt(encrypted\_text, key)** that gets a list of numbers and a key (as string) and decrypts this list into a text (as string again). Make sure that xor\_decrypt(xor\_encrypt(text, key), key) == text.  
   Example:  
    xor\_decrypt([24, 24, 26, 30, 28], "yz") -> “abcde”  
   Explanation:  
    ‘y’ = 121 -> 24 XOR 121 = 97 -> 97 = ‘a’ (or in short: 24 XOR ‘y’ = ‘a’)  
    24 XOR ‘z’ = ‘b’  
    26 XOR ‘y’ = ‘c’  
    30 XOR ‘z’ = ‘d’  
    28 XOR ‘y’ = ‘e’
2. Write a function **guess\_key(encrypted\_text, key\_size)** that tries to break a XOR encryption by a brute-force attack under the following assumptions:
   1. The decrypted text contains a standard English text containing only letters, numbers, punctuation marks, etc.
   2. The encryption key consists of *key\_size* lower-case English characters.

The function will return a list of possible matches as pairs of keys and  
 possibly-decrypted text.

1. Run your result on the “cipher.txt” file provided with key size of 3 - the result (after filtering) should be a readable English text
2. Using any Python test framework of your choice, write basic tests to ensure guess\_key is working as expected (including testing of your filtering mechanism or error handling if such exists).