CS 150: HW 7 EXAMPLE
Fall 2016

Suppose we wish to encode the character 'T' using a key of size N = 3 with a key array ORE. The corresponding mappingArray that you will need to produce is shown in red and bold on the last three lines. The first column and the second row indicate the column and row indices that you will need to use to populate and use the two-dimensional mapping array, while the first line of the table below is shown for reference.

Note that encoding can be done without searching the array for a particular character, provided that you use indices wisely. Decoding, however, requires that you do a character search on the appropriate line of your mappingArray array as described in the second example below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
0	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
1	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**
2	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**

To encode the letter 'T':

- Notice that the letter 'T' corresponds to the column index of 19 (note ASCII value for A is 65, ASCII for T is 84, so this column index can be computed from these two values)

- Given the column index of 19, we need to then find the character in the first row of the mappingArray (with row index = 0) whose column index is 19. That is, we need to determine that **mappingArray[0][19] is 'H',** but we are most interested in the corresponding column index of 7.

  Iterate this process, walking down the rows of mappingArray:

- Given the column index of 7, we now need to determine the character in the second row of the mapping array with row index = 1 whose column index is 7. In particular, we need to determine that **mappingArray[1][7] is 'Y',** but again we are most interested in the corresponding column index of 24.

  Continuing the iteration….

- Given the column index of 24, we now need to determine the character in the third row of the mapping array (with row index = 2) whose column index is 24. In particular, we need to determine that **mappingArray[2][24] is 'C'.**

Therefore, with the key size and key array given above, the character 'T' would get encoded to the character 'C'.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
0	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
1	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**
2	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**A**	**B**	**C**	**D**

To decode the letter 'C':

- Find the letter 'C' in the last row of this table (with row index = 2), and figure out how to determine that this occurs in the position whose column index is 24.
- Given that the column index of 24 corresponds to 'Y', we now need to search the second row of the mappingArray array (with row index = 1) to find the character 'Y', and note that this occurs in the position whose column index is 7.
- Given that the column index of 7 corresponds to 'H', we now need to search the first row of the mappingArray array (with row index = 0) to find the character 'H'. Since this occurs in the position whose column index is 19, this corresponds to the character 'T'.

Therefore, with the key size and key array given above, the character 'C' would get decoded to the character 'T'.

As a point of reference, if done in an efficient way, both your decodeCharacter and encodeCharacter functions should each be no longer than 25 lines. The debugger is very much your friend on this assignment.