ENGR 102 – Fall 2022
Module 12 Quiz Activity Instructions

This is an individual activity on Canvas. You may use Python, scratch paper, lecture slides found on Canvas, and NumPy's Quickstart tutorial. You may NOT use the internet to search for help. You are expected to write your own code, as needed, but you do not need to submit it.

In cryptography, a substitution cipher is a method of encryption where each letter of the plaintext message is substituted with another letter, symbol, or code. A key is needed to decrypt the encrypted message back into plaintext. A modified Bingo card (similar to a Polybius square) can be used as a key to convert plaintext letters into something else. For example:

Key:

	B	**I**	**N**	**G**	**O**
1	h	**o**	w	d	y
2	a	b	c	e	**f**
3	g	i	k	l	m
4	n	p	q	r	s
5	t	u	v	**x**	z

Using this key, the message "`fox`" is encrypted as "`O2I1G5`", which correspond to the Bingo letter-number coordinates of each letter in the plaintext message. Decrypting the message is done in reverse.

For this activity, write a Python program to decipher the following hidden message (written in English with all lowercase letters and no spaces): "`B2I4G4O4B3I5N2I4N5N2N3B1N4B2I1B3`". To crack the code, download the file mod12activity.txt which contains 25 letters of the alphabet (there is no j; i is usually substituted for j) as the key. To assemble the key, you will first need to rearrange the letters into a 5 x 5 matrix, with the first 5 letters as the first row.

Your code should print the deciphered message to the screen. As a challenge, try solving the puzzle without looking at the file!

Some helpful functions you may want to use:

- `mystr.strip()` – removes whitespace (like `\n`) at the beginning and end of `mystr`
- `mylist.index(a)` – returns the index of value `a` in `mylist`
- `numpy.where(<condition>)` – returns a tuple of arrays of the index values that satisfy the condition
- NumPy's Quickstart tutorial

*When you have completed your program and deciphered the hidden message, please take the Module 12 Quiz found on Canvas. You do **not** have to submit your code.*