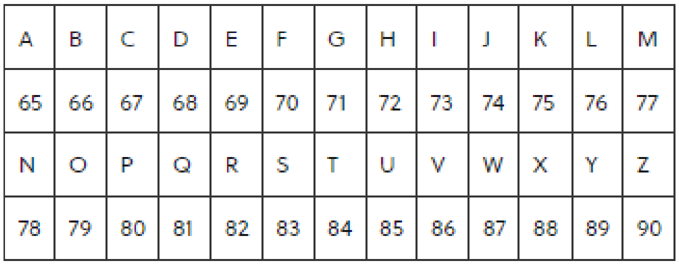
Homework

Encrypt the first three letters of your first name in uppercase letter

ENCRYPTION TYPE: RSA
PUBLIC KEY: n = 187, e=3 (to encrypt)
PRIVATE KEY: p=11, q=17, d=107 (to decrypt)
***Background information: pxq=n (11x17=187)**
p, q - chosen prime numbers, the bigger the better, more secure
e - chosen prime number
m - message to encrypt in corresponding ASCII code
c - ciphered text (m^e mod n)

ASCII Table:



A	B	C	D	E	F	G	H	I	J	K	L	M
65	66	67	68	69	70	71	72	73	74	75	76	77
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
78	79	80	81	82	83	84	85	86	87	88	89	90

ENCRYPTION				
Instructions	Example: H	First Letter: [M]	Second Letter: [I]	Third Letter: [C]
1. Find the corresponding ASCII code to your letter	72	77	73	67
2. Calculate m^e	72^3 = **373248**	77^3 = 456533	73^3 = 389017	67^3 = 300763
3. Find c = m^e mod n	373248 mod 187 = **183**	456533 mod 187 = 66	389017 mod 187 = 57	300763 mod 187 = 67
4. Your ciphered letter (c value)	183	66	57	67

DECRYPTION				
Instructions	Example: **183**	Ciphered letter: 66	Ciphered letter: 57	Ciphered letter: 67
1. Calculate m=c^d mod n	m = c^d mod n = 183^{107} mod 187 = **72**	66^{107} mod 187 = 77	57^{107} mod 187 = 57^107 mod 187 =	67^107 mod 187 = 67
2. Convert m to letter based on ASCII table	72 = **H**	77 = M	73 = I	67 = C

Use https://www.wolframalpha.com/ to calculate modulo mathematics and huge exponents

Extension: Encrypt your full first name (add columns to the table above - right click on the table and choose “insert column right” option)

Use this code to check your work in the Homework above for Encryption ONLY:

```
import math

message = input("Enter the letter to be encrypted: ")
ascii_code = ord(message)

p = 11 #private key
q = 17 #private key
e = 3  #public key

n = p*q #public key

#Encryption, c = m^e mod n
def encrypt(msg):
    m_power_e = math.pow(msg,e) #calculates m to the power of e
    c = m_power_e % n #find modulo to get the ciphered text
    print("Encrypted Message is: ", c)
    return c

print(“ASCII Code is: “, ascii_code)
c = encrypt(ascii_code)
```

https://github.com/hunter-teacher-cert/work-topics-leungbenson/blob/master/public_key/RSA.md

PKE ASYNC:
Find another type of encryption and give a brief summary of how it works. Post on Slack and comment on one other person’s post.