# Adriana_Machado_E_D_Mini_Notebook

April 13, 2021

RSA Key Code

```
In [ ]: print("Hello, welcome to Adriana Machado's encryption/decryption machine. What is your
        x = input()
        print("Nice to meet you, ", x, ". I am a non-sentient machine; you can call me Arendt.'
        print("Please enter in ALL CAPS any variation of the English 26-letter alphabet with no
        y = input()
```

```
In [ ]: p = 13 # integer greater than or equal to 13
        q = 17 # integer greater than or equal to 17
        n = p * q # public key
        e = 5 # public key
        i = 2
```

```
In [ ]: def f(n):

            """phi function of n
            Argument: n
            Output: p*q-p-q+1"""

            return int((p - 1)*(q - 1))
```

```
In [ ]: d = int(((i * f(n)) + 1) / e) # private key
```

```
In [ ]: print("Your phi(n) is: ", f(n))
```

Cypher

```
In [ ]: caps_alpha = {"A":1, "B":2, "C":3, "D":4, "E":5, "F":6, "G":7, "H":8, "I":9, "J":10, "
        num_caps_alpha = {1:"A", 2:"B", 3:"C", 4:"D", 5:"E", 6:"F", 7:"G", 8:"H", 9:"I", 10:"J
```

```
In [ ]: def cypher(y):

            """
            For processing letters to numbers through the caps_alpha cypher.

            Argument: ALL CAPS series of letters
            Output: a list of numbers corresponding to each original letter
            """
```

```
            l_to_n = []
            for letter in y:
                number = caps_alpha.get(letter)
                l_to_n.append(number)
            return l_to_n

        cypher = cypher(y)
```

In [ ]:
```
print("Your cypher is: ", cypher)
```

Encryption

In [ ]:
```
def c_encryption(cypher):

            """
            For processing the list of numbers generated by the cypher through the given encry
            Argument: cypher output list of numbers
            Output: list of encrypted numbers
            """

            c_to_e = []
            for number in cypher:
                c = int((number**e)%n)
                c_to_e.append(c)
            return c_to_e

        encryption = c_encryption(cypher)
```

In [ ]:
```
print("Your encryption is: ", encryption)
```

Decryption

In [ ]:
```
def e_decryption(encryption):

            """
            To return the decrypted list of integers representing the cyphered user input
            Argument: encryption list
            Output: cypher list"""

            e_to_d= []
            for number in encryption:
                decrypted = int((number**d)%n)
                e_to_d.append(decrypted)

            return e_to_d

        decryption = e_decryption(encryption)
```

```
In [ ]: print("Your decryption is: ", decryption)
        print("For reference, your cypher was: ", cypher)
        if decryption == cypher:
            print("They match! Hurray!")
        if decryption != cypher:
            print("Woops, something went wrong...")

In [ ]: def reverse_cypher(decryption):

            """To send the decrypted message back through the cypher and get the original mess
            Argument: Decryption list
            Output: Decyphered list"""

            d_to_l = []
            for int in decryption:
                letter = num_caps_alpha.get(int)
                d_to_l.append(letter)
            return d_to_l

        r_cypher = reverse_cypher(decryption)

In [ ]: cypher_string = ""
        print("Your original input text was: ", cypher_string.join(r_cypher))
        print("ET VOILÀ!!!")
```