Cryptography: Coding Lab 1

Due: Tuesday, Sep. 24, 2024

Goal: Implement a computer program utilizing modular arithmetic that can encrypt and decrypt messages using a Caesar shift cipher and a transposition cipher.

Part 1: Caesar Shift

1) Below, write pseudocode for a program that will ask for a plaintext message and an integer key between 1 and 26 and output the appropriate cipher text.

Python: define a function Cencrypt that performs the above algorithm.

- 2) How would this program need to be changed to decrypt a cipher text given a key? Python: define a function Cdecrypt and have the user choose encrypt/decrypt upon opening the program.
- 3) How would the decrypt function be changed to allow a brute force attack if we did not know the key?

Python: Add an option to the decrypt function so if the person does not know the key, the program will perform a brute force attack.

- 4) Check that your program works with the following message/ciphertext pair e(3, 'hello world') = KHOORZRUOG
- 5) Choose a message of your own to encrypt and then send the ciphertext to another group for them to decrypt (without the key).

 Write down your message/ciphertext/key here.

Write the other group's ciphertext and your decryption of it here, along with their key.

Part 2: Transposition Cipher

- 1) Below, write pseudocode for a program that will ask for a plaintext message and an integer key and output the appropriate cipher text.
 - Python: define a function Tencrypt that performs the above algorithm.
- 2) How would this program need to be changed to decrypt a cipher text given a key?

 Python: define a function Tdecrypt and have the user choose encrypt/decrypt upon opening the program.
- 3) How would the decrypt function be changed to allow a brute force attack if we did not know the key?
 - Python: Add an option to the decrypt function so if the person does not know the key, the program will perform a brute force attack.
- 4) Check that your program works with the following message/ciphertext pair e(3, 'hello world') = HOLEWDLOLR
- 5) Choose a message of your own to encrypt and then send the ciphertext to another group for them to decrypt (without the key). Write down your message/ciphertext/key here.
 - Write the other group's ciphertext and your decryption of it here, along with their key.