

## Homework – 1: (Due on September 26<sup>th</sup> in class)

**Note:** Please send me an email with your code attached and also submit a hard copy in class, so that I can write comments on it.

Implement the following (preferably in Java, but you can use Python too.):

1. Write a program that computes the relative frequencies of letters in a text.
2. Implement the working of a Shift cipher. You should provide a continuous stream of characters as input and it should generate the ciphertext as the output. Your program should also perform the decryption of the encrypted text. Use it to decrypt the following ciphertext:

*xultpaajcxitltlxaarpjhtiwtgxktghidhipxciwvtgtpilpitghlxiwiwtxgqadds.*

[Hint: Use frequency analysis to find the key. You can use the program that you'll write for problem 1.]

3. Implement the working of an affine cipher, where you would have to define a class **AffineKey** (assuming you are coding in Java). The class would have 2 instance variables corresponding to the parameters **a** and **b**, which are the two components of the key. Write the encryption, decryption methods and a tester class **AffineTester** to test the encryption and decryption method.
4. Implement the Vigenere encryption algorithm. Implement two separate methods for encryption and decryption. Encrypt the following paragraph (ignoring the spaces and punctuations) with two different keys:

*Hellenism was the combination of Greek, Persian, and Egyptian cultures. During this remarkable time period, people were encouraged to pursue a formal education and produce many different kinds of art. New forms of math, science, and design made a great impact on society.*

Decrypt to verify that you get the correct plaintext back.