1. Problem 2.1 in Stallings.

2. Suppose a Hill Cipher with $m = 2$ is used to encrypt a message, as described in Section 2.2 of Stallings. You are given the plaintext cdji and the corresponding ciphertext DCOP. What is the secret key?

3. The Affine Hill Cipher is an extension of the Hill Cipher. We describe the scheme with $m = 2$. The key consists of a $2 \times 2$ matrix

$$K = \begin{pmatrix} k_{11} & k_{12} \\ k_{21} & k_{22} \end{pmatrix}$$

along with a vector

$$V = \begin{pmatrix} v_1 \\ v_2 \end{pmatrix}.$$

A pair $(p_1, p_2)$ of plaintext letters (viewed as integers between 0 and 25) are encrypted as follows:

$$\begin{pmatrix} c_1 \\ c_2 \end{pmatrix} = K \begin{pmatrix} p_1 \\ p_2 \end{pmatrix} + V \mod 26,$$

so that the pair of plaintext letters $(p_1, p_2)$ is transformed into the pair of ciphertext letters $(c_1, c_2)$.

You are given the plaintext yzachh and the corresponding ciphertext IBTGY. What is the secret key, i.e., what are $K$ and $V$?