Kriptosistem

$$\begin{aligned} \mathcal{B} &\dots \text{besedila} \\ \mathcal{C} &\dots \text{kriptogrami} \\ \mathcal{K} &\dots \text{ključi} \\ \mathcal{E} = \{E_k : \mathcal{B} \to \mathcal{C}; k \in \mathcal{K}\} &\dots \text{kodirne f.} \\ \mathcal{D} = \{D_k : \mathcal{C} \to \mathcal{B}; k \in \mathcal{K}\} &\dots \text{dekodirne f.} \end{aligned}$$

Za vsak $e \in \mathcal{K}$ obstaja $d \in \mathcal{K}$

$$D_d(E_e(x)) = x \quad \forall x \in \mathcal{B}$$

Vsaka kodrirna funkcija $E_k \in \mathcal{E}$ je injektivna.

Klasični kriptosistem

Cezarjeva šifra

$$\mathcal{B} = \mathcal{C} = \mathcal{K} = \mathbb{Z}_{25}$$

$$E_k(x) \equiv x + k \mod 25$$

$$D_k(y) \equiv y - k \mod 25$$

Substitucijska šifra

$$\mathcal{B} = \mathcal{C} = \mathbb{Z}_{25}, \quad \mathcal{K} = S(\mathbb{Z}_{25})$$

Ključ je permutacija $\pi \in \mathcal{K}$

$$E_k(x) = \pi(x)$$

$$D_k(y) = \pi^{-1}(y)$$

Afina šifra

$$\mathcal{B} = \mathcal{C} = \mathbb{Z}_{25}, \quad \mathcal{K} = \mathbb{Z}_{25}^* \times \mathbb{Z}_{25}$$

Ključ $(a, b) \in \mathcal{K}$

$$K_{(a,b)}(x) = ax + b \mod 25$$

$$D_{(a,b)}(y) = a^{-1}(y - b) \mod 25$$

Vigenerjeva šifra

$$\mathcal{B} = \mathcal{C} = \mathcal{K} = \mathbb{Z}_{25}^n$$

Ključ $\underline{k} \in \mathcal{K}$

$$K_{\underline{k}}(\underline{x}) = \underline{x} + \underline{k} \mod 25$$

$$D_{\underline{k}}(\underline{y}) = \underline{y} - \underline{k} \mod 25$$

Permutacijska šifra

Simbolov ne nadomeščamo, ampak jih premešamo

$$\mathcal{B} = \mathcal{C} = \mathbb{Z}_{25}^n, \quad \mathcal{K} = S_n$$

$$K_\pi(\underline{x}) = \underline{x}_{\pi(1)} + \cdots + \underline{x}_{\pi(n)}$$

$$D_\pi(\underline{x}) = \underline{x}_{\pi^{-1}(1)} + \cdots + \underline{x}_{\pi^{-1}(n)}$$

Hillova šifra

$$\mathcal{B} = \mathcal{C} = \mathbb{Z}_{25}^n, \quad \mathcal{K} = \{A \in \mathbb{Z}_{25}^{n \times n} \,|\, \det(A) \in \mathbb{Z}_{25}^*\}$$

Ključ je matrika $A \in \mathcal{K}$

$$K_A(\underline{x}) = A\underline{x} \mod 25$$

$$D_A(\underline{y}) = A^{-1}\underline{y} \mod 25$$