4.3.1

$$S = \overbrace{(\ \ldots\ )\cdot(\ \ldots\ )\cdot\ldots\cdot(\ \ldots\ )}^{\text{эл. из } S_n}$$

$$\quad k_1 \qquad\qquad k_2 \qquad\qquad k_x$$

Пример. записи

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix} = (12)\cdot(34)$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix} = (123)$$

$$\underset{\text{цикл. пер.}}{c}^{m} = id \iff m \,\vdots\, len(c)$$

$$\underbrace{s\circ s\circ\ldots\circ s}_{m} = s^m = c_1^m\cdot c_2^m\cdot\ldots\cdot c_x^m = id \iff \forall c_i \quad m \,\vdots\, \underset{\substack{\| \\ k_i}}{len(c_i)}$$

$$\operatorname{ord} s = \text{НОК}(k_1, k_2 \ldots k_x) \leq k_1\cdot k_2\cdot\ldots\cdot k_x$$

$$k_1 + \ldots + k_x = n$$

$$\max(\underbrace{k_1\cdot k_2\cdot\ldots\cdot k_x}) \leq e^{\frac{n}{e}}$$

$x \in \mathbb{N}$ – фикс.

$$k_1 = k_2 = \ldots = k_x = \frac{n}{x}$$

$$\frac{k_1 + k_2 + \ldots + k_x}{x} \geq \sqrt[x]{k_1\cdot k_2\cdot\ldots\cdot k_x}$$

(равенство достиг. при)

$$\left(\frac{n}{x}\right)^x \leftarrow \text{ищем max по } x$$

$$\left(\frac{n}{x}\right)^x\cdot\left(x\cdot\ln\left(\frac{n}{x}\right)\right)' = 0$$

$$\left(\frac{n}{x}\right)^x\cdot\left(\ln\left(\frac{n}{x}\right) + x\cdot\frac{x}{n}\cdot\frac{-n}{x^2}\right) = 0$$

$$\left(\frac{n}{x}\right)^x\cdot\left(\ln\left(\frac{n}{x}\right) - 1\right) = 0$$

$$\frac{n}{x} = e \to x = \frac{n}{e} \to \max = \left(\frac{n}{\frac{n}{e}}\right)^{\frac{n}{e}} = e^{\frac{n}{e}}$$