

Задача по теории алгоритмов.

Написать схему НА, который входное слово  $x$  в некотором алфавите  $V$  перерабатывает в слово  $x^R x$ .

Решение.

Схема НА:

$$\left\{ \begin{array}{ll} \xi \beta \eta \rightarrow \beta \eta \xi & // \xi, \eta \in V; \beta \notin V \quad (1) \\ \alpha \xi \rightarrow \beta \xi \xi \alpha & // \alpha \notin V \quad (2) \\ \beta \rightarrow & (3) \\ \alpha \rightarrow \cdot & (4) \\ & \rightarrow \alpha \quad (5) \end{array} \right.$$

Протокол:

1)  $x = \lambda \vdash_{(5)} \alpha \vdash_{(4)} \cdot \lambda$

2)  $x = abc \vdash_{(5)} \alpha abc \vdash_{(2)} \beta a \alpha b c \vdash_{(2)} \beta a \alpha \beta b \alpha c \vdash_{(1)}$

$\vdash_{(1)} \beta a \beta b a \alpha c \vdash_{(1)} \beta \beta b a a \alpha c \vdash_{(2)} \beta \beta b a a \beta c c \alpha \vdash_{(1)}$

$\vdash_{(1)} \beta \beta b a a \beta c c \alpha \vdash_{(1)} \beta \beta b a \beta c a \alpha c \vdash_{(1)} \beta \beta b \beta c a a \alpha b c \alpha \vdash_{(1)}$

$\vdash_{(1)} \beta \beta \beta c a a \alpha b c \alpha \vdash_{(3)} \beta \beta c a a \alpha b c \alpha \vdash_{(13)}^2 c b a a \alpha b c \alpha \vdash_{(4)} \cdot$

~~$\beta \beta \beta c a a \alpha b c \alpha$~~   $\vdash_{(4)} \cdot c b a a \alpha b c$

3)  $x = baabab \vdash_{(5)} \alpha baabab \vdash_{(2)} \beta b \alpha a b a b \vdash_{(2)}$

$\vdash_{(2)} \beta b \beta b a a \alpha a b a b \vdash_{(1)}^2 \beta \beta a b b a \alpha a b a b \vdash_{(2)} \beta \beta a b b a \beta a a \alpha b a b \vdash_{(10)}^4$

$\vdash_{(1)}^4 \beta \beta \beta a a b b a a \alpha a b a b \vdash_{(2)} \beta \beta \beta a a b b a a \beta b b \alpha a b \vdash_{(1)}^6$

$\frac{6}{(1)} \beta\beta\beta\beta \text{ баабваавдab } \frac{2}{(2)} \beta\beta\beta\beta \text{ баавваавбаадb } \frac{2}{(1)}$

$\frac{8}{(1)} \beta\beta\beta\beta\beta \text{ абааавваавадb } \frac{2}{(2)} \beta\beta\beta\beta\beta \text{ абаавваавбаавдb } \frac{10}{(1)}$

$\frac{10}{(1)} \beta\beta\beta\beta\beta\beta \text{ бабааавваавадb } \frac{6}{(3)} \text{ бабаавваавадb } \frac{4}{(4)}$

$\frac{1}{(4)} \cdot \text{бабаавваавбаб}$