

FORMÁLNÍ JAZYKY A AUTOMATY I

Řešení cvičení 8.

1. a) $\mathcal{A} = (\{q\}, \{a, e, +, *, (,)\}, \{R, K, I, D, a, e, +, *, (,)\}, \delta, q, R, \emptyset),$

$$\delta(q, \varepsilon, R) = \{(q, R + K), (q, K)\}$$

$$\delta(q, \varepsilon, K) = \{(q, KI), (q, I)\}$$

$$\delta(q, \varepsilon, I) = \{(q, I^*), (q, D)\}$$

$$\delta(q, \varepsilon, D) = \{(q, (R)), (q, a), (q, e)\}$$

$$\delta(q, x, x) = \{(q, \varepsilon)\} \text{ pro všechna } x \in \{a, e, +, *, (,)\}$$

b) $\mathcal{A} = (\{q, r\}, \{a, e, +, *, (,)\}, \{R, K, I, D, a, e, +, *, (,), \$\}, \delta, q, \$, \{r\}),$

$$\delta(q, x, \varepsilon) = \{(q, x)\} \text{ pro všechna } x \in \{a, e, +, *, (,)\}$$

$$\delta(q, \varepsilon, R + K) = \{(q, R)\}$$

$$\delta(q, \varepsilon, K) = \{(q, R)\}$$

$$\delta(q, \varepsilon, K + I) = \{(q, K)\}$$

$$\delta(q, \varepsilon, I) = \{(q, K)\}$$

$$\delta(q, \varepsilon, I^*) = \{(q, I)\}$$

$$\delta(q, \varepsilon, D) = \{(q, I)\}$$

$$\delta(q, \varepsilon, (R)) = \{(q, D)\}$$

$$\delta(q, \varepsilon, a) = \{(q, D)\}$$

$$\delta(q, \varepsilon, e) = \{(q, D)\}$$

$$\delta(q, \varepsilon, \$R) = \{(r, \varepsilon)\}$$

2. a) $\mathcal{A}_1 = (\{p_1, p_2, q_0, q_1, f\}, \{a, b\}, \{a, Z\}, \delta, p_1, Z, \{f\})$

$$\delta(p_1, a, Z) = \{(p_2, Z)\}$$

$$\delta(p_2, b, Z) = \{(q_0, Z_0)\}$$

$$\delta(q_0, a, Z) = \{(q_0, aZ)\}$$

$$\delta(q_0, a, a) = \{(q_0, aa)\}$$

$$\delta(q_0, b, a) = \{(f, aa)\}$$

$$\delta(f, a, a) = \{(q_1, \varepsilon)\}$$

$$\delta(q_1, a, a) = \{(q_1, \varepsilon)\}$$

$$\delta(q_1, b, Z) = \{(q_0, Z)\}$$

b) Každé slovo w patřící do jazyka $\Sigma^* - (L_1 \cap L_2)$ splňuje alespoň jednu z následujících podmínek:

s_1 : začíná symbolem b

s_2 : začíná řetězem aa

s_3 : končí symbolem a

s_4 : neobsahuje symbol b

s_5 : obsahuje lichý počet symbolů b

s_6 : $w = a^{i_1} b a^{i_2} \dots a^{i_k} b$ a existuje x takové, že $i_x + 1 \neq i_{x+1}$

$$\mathcal{A} = (\{s, s_1, s_2, \overline{s_2}, s_3, s_4, s_5, \overline{s_5}, s_6, f, k, n, u, v\}, \{a, b\}, \{a, Z\}, \delta, s, Z, \{f, k, s_4, \overline{s_5}\})$$

$$\delta(s, \varepsilon, Z) = \{(s_1, Z), (s_2, Z), (s_3, Z), (s_4, Z), (s_5, Z), (s_6, Z)\}$$

$$\delta(s_1, b, Z) = \{(f, Z)\} \quad \delta(f, a, Z) = \delta(f, b, Z) = \{(f, Z)\}$$

$$\delta(s_2, a, Z) = \{(\overline{s_2}, Z)\} \quad \delta(\overline{s_2}, a, Z) = \{(f, Z)\}$$

$$\delta(s_3, b, Z) = \{(s_3, Z)\} \quad \delta(s_3, a, Z) = \{(s_3, Z), (k, Z)\}$$

$$\delta(s_4, a, Z) = \{(s_4, Z)\}$$

$$\delta(s_5, a, Z) = \{(s_5, Z)\} \quad \delta(s_5, b, Z) = \{(\overline{s_5}, Z)\}$$

$$\delta(\overline{s_5}, a, Z) = \{(\overline{s_5}, Z)\} \quad \delta(\overline{s_5}, b, Z) = \{(s_5, Z)\}$$

$$\delta(s_6, a, Z) = \{(n, Z), (u, aZ)\}$$

$$\delta(n, a, Z) = \{(n, Z)\} \quad \delta(n, b, Z) = \{s_6, Z\}$$

$$\delta(u, a, a) = \{(u, aa)\} \quad \delta(u, b, a) = \{v, aa\}$$

$$\delta(v, a, a) = \{(v, \varepsilon)\} \quad \delta(v, b, a) = \{f, Z\}$$

$$\delta(v, a, Z) = \{(f, Z)\}$$

