xkaspa48

1) $Q = aR + bS$

$R = cQ + bS + \varepsilon$

$S = cS + bQ \qquad S = c^*bQ$

$Q = aR + bc^*bQ$

$R = cQ + bc^*bQ + \varepsilon$

$Q = a\cdot(cQ + bc^*bQ + \varepsilon) + bc^*bQ$

$Q = acQ + abc^*bQ + a + bc^*bQ$

$Q = Q\cdot(ac + abc^*b + bc^*b) + a$

$Q = (ac + abc^*b + bc^*b)^* a$

2) $L_1 = \{w \mid w \in \{a,b,c\}^* \wedge \#_a(w) > \#_b(w) \wedge \#_c(w) = 2\}$

předpokládám $L_1 \in \mathcal{L}_3$

$w = b^{p-1}c^2a^p \qquad p-1+2+p > p$

$p-1 < p$

$xyz = w \qquad p = \alpha + \beta + (p-\alpha-\beta)$

$x = b^\alpha \qquad \alpha \geq 0$

$y = b^\beta \qquad \beta \geq 1$

$z = b^{p-1-\alpha-\beta}c^2a^p \qquad p-1-\alpha-\beta < p$

$i = 3$

$xy^iz = b^\alpha b^{3\cdot\beta} b^{p-1-\alpha-\beta} c^2 a^p$

jelikož $\beta \geq 1$, pak $\alpha + 3\cdot\beta + (p-\alpha-\beta-1) > p$, dochází ke sporu $\Rightarrow L_1 \notin \mathcal{L}_3$

3) $L_2 = \{xw \mid w \in \{a,b\}^* \wedge (\#_a(w) \bmod 2 = x)\}$

4) $L_3 = \{ w_1 \# w_2 \mid w_1, w_2 \in \{a,b,c\}^* \wedge (\#_a(w_1) = \#_b(w_2) \vee \#_a(w_1) = \#_c(w_2)) \}$

$S \to A \mid B$

$A \to aAb \mid bA \mid cA \mid Ac \mid Aa \mid \#$

$B \to aBc \mid bB \mid cB \mid Bb \mid Ba \mid \#$

$P = (\{q\}, \{a,b,c,\#\}, \{z_0, S, A, B, a, b, c, \#\}, \delta, q, z_0, \emptyset \}$

$\delta(q, S, z_0) = \{(q, A); (q, B)\}$

$\delta(q, A, A) = \{(q, aAb); (q, bA); (q, cA); (q, Ac); (q, Aa); (q, \#)\}$

$\delta(q, B, B) = \{(q, aBc); (q, bB); (q, cB); (q, Bb); (q, Ba); (q, \#)\}$

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

$\delta(q, b, b) = \{(q, \varepsilon)\}$

$\delta(q, c, c) = \{(q, \varepsilon)\}$

$\delta(q, \#, \#) = \{(q, \#)\}$

5) $L_4 = \{ w_1 \# w_2 x \mid w_1, w_2 \in \{a,b\}^* \wedge (w_1 = w_2^R \wedge x = 0) \vee (|w_1| < |w_2| \wedge x = 1) \}$