

## 8. Automat ze stosem – zadania

Podać postać słów języków akceptowanych przez poniższe automaty ze stosem:

### 8.1.

$$Q = \{ q_0, q_1, q_2 \}$$

$$T = \{ a, b \}$$

$$S = \{ A, B, C, \# \}$$

$$s_0 = \#$$

$$F = \{ q_2 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$$

$$\delta(q_0, a, A) = \{ (q_0, ABB) \}$$

$$\delta(q_0, a, B) = \{ (q_0, BCCCC) \}$$

$$\delta(q_0, a, C) = \{ (q_0, CA) \}$$

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

$$\delta(q_1, b, A) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, B) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, CC) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, \$, \#) = \{ (q_2, \varepsilon) \}$$

### 8.2.

$$Q = \{ q_0, q_1, q_2 \}$$

$$T = \{ a, b \}$$

$$S = \{ A, B, C, \# \}$$

$$s_0 = \#$$

$$F = \{ q_2 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$$

$$\delta(q_0, a, A) = \{ (q_0, ABB) \}$$

$$\delta(q_0, a, B) = \{ (q_0, BCCCC) \}$$

$$\delta(q_0, a, C) = \{ (q_0, CA) \}$$

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

$$\delta(q_1, b, B) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, C) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, A) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, \$, \#) = \{ (q_2, \varepsilon) \}$$

### 8.3.

$$Q = \{ q_0, q_1, q_2, q_3 \}$$

$$T = \{ a, b \}$$

$$S = \{ A, B, C, \# \}$$

$$s_0 = \#$$

$$F = \{ q_3 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$$

$$\delta(q_0, a, A) = \{ (q_0, ABB) \}$$

$$\delta(q_0, a, B) = \{ (q_0, BCCCC) \}$$

$$\delta(q_0, a, C) = \{ (q_0, CA) \}$$

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

$$\delta(q_1, b, B) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, b, A) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, b, CC) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, b, BB) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, \$, \#) = \{ (q_3, \varepsilon) \}$$

### 8.4.

$$Q = \{ q_0, q_1, q_2 \}$$

$$T = \{ a, b \}$$

$$S = \{ A, B, C, \# \}$$

$$s_0 = \#$$

$$F = \{ q_2 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$$

$$\delta(q_0, a, A) = \{ (q_0, ABB) \}$$

$$\delta(q_0, a, B) = \{ (q_0, BCCC) \}$$

$$\delta(q_0, a, C) = \{ (q_0, CA) \}$$

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

$$\delta(q_1, b, A) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, BB) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, b, C) = \{ (q_1, \varepsilon) \}$$

$$\delta(q_1, \$, \#) = \{ (q_2, \varepsilon) \}$$

**8.5.**

$Q = \{ q_0, q_1, q_2, q_3 \}$   
 $T = \{ a, b, c, d \}$   
 $S = \{ A, B, C, D, \# \}$   
 $s_0 = \#$   
 $F = \{ q_3 \}$   
 $q_0$  – st. pocz.

$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$   
 $\delta(q_0, a, A) = \{ (q_0, ABB) \}$   
 $\delta(q_0, a, B) = \{ (q_0, BCCCC) \}$   
 $\delta(q_0, a, C) = \{ (q_0, CA) \}$   
 $\delta(q_0, b, CC) = \{ (q_2, DD) \}$   
 $\delta(q_2, d, DD) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, c, CC) = \{ (q_1, \varepsilon) \}$   
 $\delta(q_1, a, A) = \{ (q_1, \varepsilon) \}$   
 $\delta(q_1, b, B) = \{ (q_1, \varepsilon) \}$   
 $\delta(q_1, b, CC) = \{ (q_2, DD) \}$   
 $\delta(q_1, \$, \#) = \{ (q_3, \varepsilon) \}$

**8.6.**

$Q = \{ q_0, q_1, q_2, q_3, q_4 \}$   
 $T = \{ a, b, d \}$   
 $S = \{ A, B, C, D, \# \}$   
 $s_0 = \#$   
 $F = \{ q_4 \}$   
 $q_0$  – st. pocz.

$\delta(q_0, a, \#) = \{ (q_1, \#A) \}$   
 $\delta(q_1, a, A) = \{ (q_2, ABB) \}$   
 $\delta(q_2, a, B) = \{ (q_0, BCCCC) \}$   
 $\delta(q_0, a, C) = \{ (q_1, CA) \}$   
 $\delta(q_1, b, A) = \{ (q_3, \varepsilon) \}$   
 $\delta(q_3, d, C) = \{ (q_3, D) \}$   
 $\delta(q_3, b, CD) = \{ (q_3, \varepsilon) \}$   
 $\delta(q_3, a, CC) = \{ (q_3, \varepsilon) \}$   
 $\delta(q_3, b, B) = \{ (q_3, \varepsilon) \}$   
 $\delta(q_3, a, A) = \{ (q_3, \varepsilon) \}$   
 $\delta(q_3, \$, \#) = \{ (q_4, \varepsilon) \}$

**8.7.**

$Q = \{ q_0, q_1, q_2, q_3 \}$   
 $T = \{ a, b, c, d \}$   
 $S = \{ A, B, C, \# \}$   
 $s_0 = \#$   
 $F = \{ q_3 \}$   
 $q_0$  – st. pocz.

$\delta(q_0, a, \#) = \{ (q_0, \#A) \}$   
 $\delta(q_0, b, A) = \{ (q_1, ABBBB) \}$   
 $\delta(q_0, a, C) = \{ (q_0, CA) \}$   
 $\delta(q_1, c, B) = \{ (q_0, BCC) \}$   
 $\delta(q_1, d, BBBB) = \{ (q_2, A) \}$   
 $\delta(q_2, d, A) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, d, B) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, d, C) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, \$, \#) = \{ (q_3, \varepsilon) \}$

**8.8.**

$Q = \{ q_0, q_1, q_2, q_3 \}$   
 $T = \{ a, b, d \}$   
 $S = \{ A, B, C, \# \}$   
 $s_0 = \#$   
 $F = \{ q_3 \}$   
 $q_0$  – st. pocz.

$\delta(q_0, a, \#) = \{ (q_1, \#A) \}$   
 $\delta(q_0, a, C) = \{ (q_1, CA) \}$   
 $\delta(q_0, a, A) = \{ (q_1, ABBB) \}$   
 $\delta(q_1, b, A) = \{ (q_0, AAA) \}$   
 $\delta(q_1, b, B) = \{ (q_0, BC) \}$   
 $\delta(q_1, d, BBB) = \{ (q_2, C) \}$   
 $\delta(q_2, d, A) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, d, B) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, d, C) = \{ (q_2, \varepsilon) \}$   
 $\delta(q_2, \$, \#) = \{ (q_3, \varepsilon) \}$

**8.9**

$$Q = \{ q_0, q_1, q_2, q_3 \}$$

$$T = \{ a, b, c, d \}$$

$$S = \{ A, B, C, D, \# \}$$

$$s_0 = \#$$

$$F = \{ q_3 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_1, \#A) \}$$

$$\delta(q_0, a, C) = \{ (q_1, CA) \}$$

$$\delta(q_1, a, A) = \{ (q_0, ABB) \}$$

$$\delta(q_0, b, B) = \{ (q_0, BDDD) \}$$

$$\delta(q_0, c, D) = \{ (q_0, DCC) \}$$

$$\delta(q_0, d, D) = \{ (q_2, AA) \}$$

$$\delta(q_2, a, A) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, b, B) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, c, C) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, d, D) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, \$, \#) = \{ (q_3, \varepsilon) \}$$

**8.10.**

$$Q = \{ q_0, q_1, q_2, q_3 \}$$

$$T = \{ a, b, c \}$$

$$S = \{ A, B, C, \# \}$$

$$s_0 = \#$$

$$F = \{ q_3 \}$$

$q_0$  – st. pocz.

$$\delta(q_0, a, \#) = \{ (q_1, \#A) \}$$

$$\delta(q_0, a, C) = \{ (q_1, CA) \}$$

$$\delta(q_1, a, A) = \{ (q_0, AAA) \}$$

$$\delta(q_0, b, A) = \{ (q_0, ABBBB) \}$$

$$\delta(q_0, c, B) = \{ (q_0, BCC) \}$$

$$\delta(q_1, b, A) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, c, A) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, b, CC) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, a, BB) = \{ (q_2, \varepsilon) \}$$

$$\delta(q_2, \$, \#) = \{ (q_3, \varepsilon) \}$$