II Construct RLG and FA corresp. to the fol. RE: $0^*(10+01)^*$

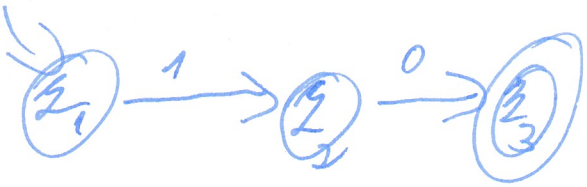
RLG

FA

0^*: $S \to 0S \mid \varepsilon$

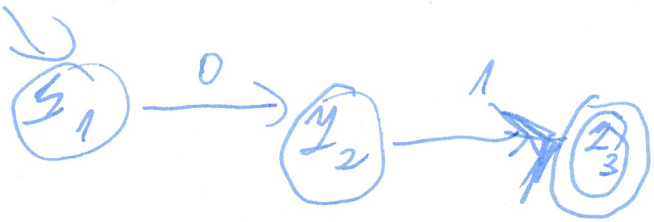
10: $S \to 1S_1$

$S_1 \to 0$



01: $S \to 0S_1$

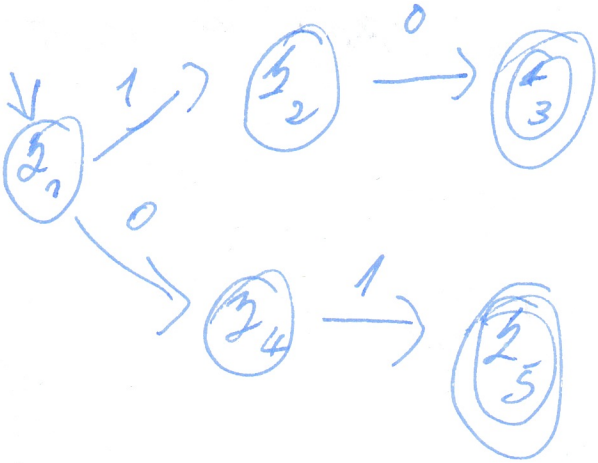
$S_1 \to 1$



$(10+01)$: $S \to 1S_1 \mid 0S_2$

$S_1 \to 0$

$S_2 \to 1$



$(10+01)^*$: $S \to 1S_1 \mid 0S_2 \mid \varepsilon$

$S_1 \to 0S$

$S_2 \to 1S$

$0^*(10+01)^*$:

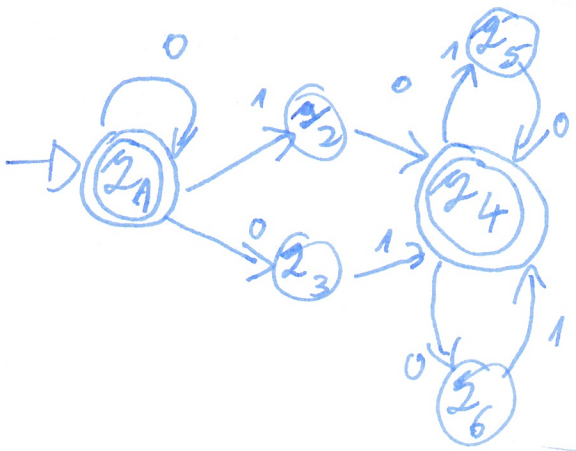
$S \to 0S_1 | \varepsilon$

$S_1 \to 0S_1 | 0 | 0S_2 | 1S_3$

$S_2 \to 1 | 1S_4$

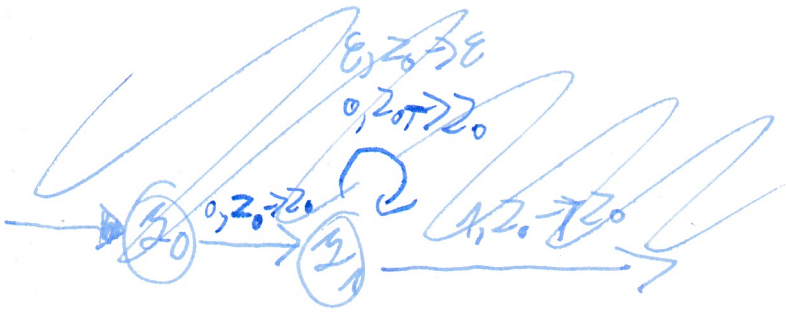
$S_3 \to 0 | 0S_4$

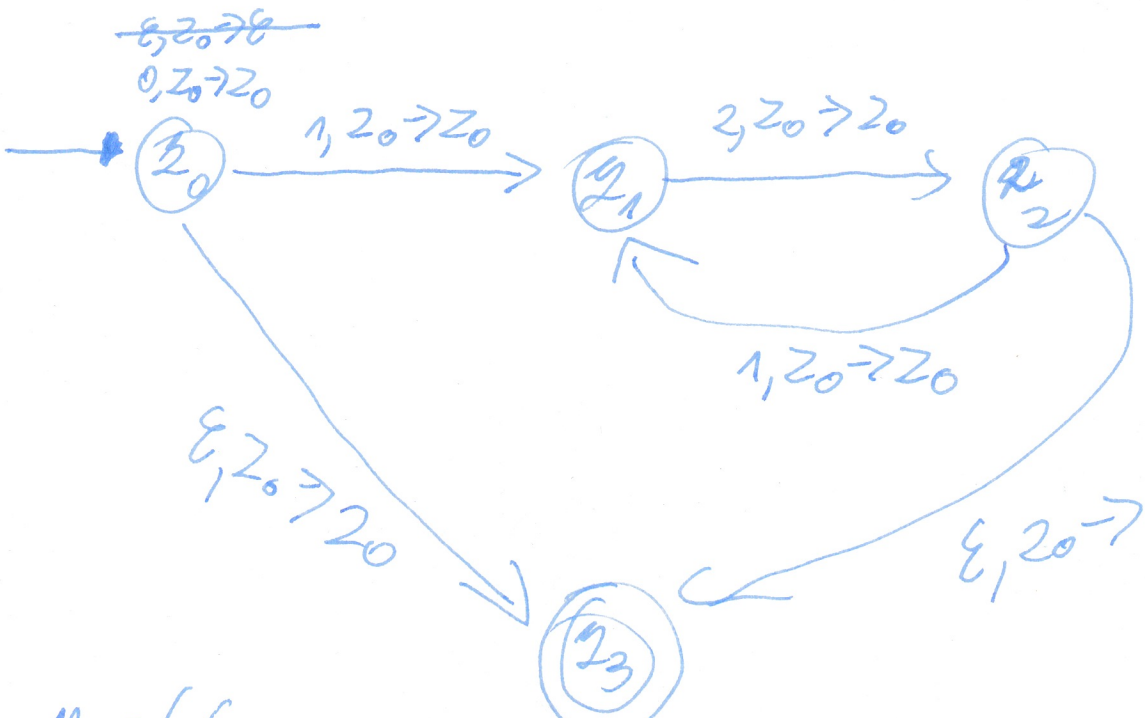
$S_4 \to 0S_2 | 1S_3$



III Construct a push-down automaton corresp. to the lang.:

$L = \{ 0^m (12)^n \mid n > 0, m \geq 0 \}$





$M = (\{q_0, q_1, q_2, q_3\}, \{0,1,2\}, \{Z_0\}, \delta, q_0, Z_0, \{q_3\})$

Q Σ Γ

$\delta : Q \times (\Sigma \cup \{\varepsilon\}) \times \Gamma \to P(Q \times \Gamma^*)$

V

label	operator	arg 1	arg 2	result
(1)	:=	0	—	n
(2)	:=	1	—	x
(3)	:=	1	—	i
(4)	>	i	n	t_1
(5)	goto	t_1	—	(17)
(6)	mod	a	x	t_2
(7)	=	t_2	0	t_3
(8)	goto	t_3	—	(12)
(9)	*	x	i	t_4
(10)	:=	t_4	—	x
(11)	goto	—	—	(14)
(12)	+	n	i	t_5
(13)	:=	t_5	—	n
(14)	+	i	1	t_6
(15)	:=	t_6	—	i
(16)	goto	—	—	(4)
(17)				

I

1) $L_1 = \{\varepsilon, 0, 1\}$, $L_2 = \{0, 11\}$

which elems. belong to $L_1 \cup L_2$?

a) ε b) 10 c) 0 d) 11

R: a, c, d

2) Which of the following matches regexp $a(cb)^*$

a) aaba b) a

c) aabcbcb d) ba

R: b, c

3) Consider the grammar with productions $S \to RT;\ R \to Ra;\ T \to b$. unproductive:

a) R b) R, S c) R, S, T d) S

R: a (?) both R and S are unproductive

4) Consider the FA

which reg. belongs to $L(M)$?

a) 00 b) 01 c) 011 d) 010

R: a, b, d

IV Consider the grammar $G = (\{S, A, B, C, D\}, \{[,], d, c, ;, :\}, P, S)$ where:

P: $S \to [D;C]$

$D \to dB$

$B \to :D \mid \varepsilon$

$C \to cA$

$A \to \varepsilon \mid ;A$

Construct First and Follow for the nonterminals of the grammar.