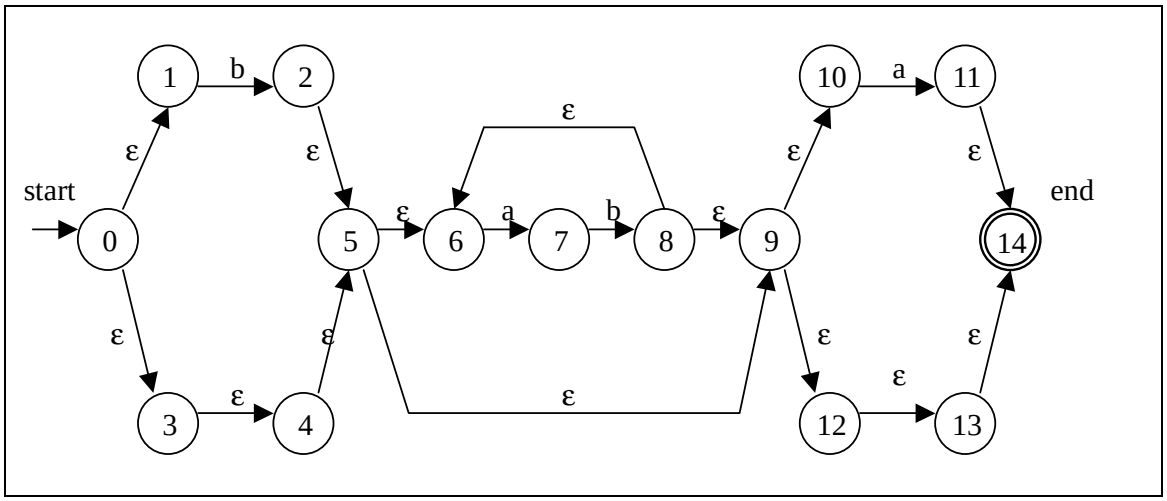
CSCI410 Midterm Solutions (Spring 2002)

Problem 1 [10]

Part A: leftmost
Part B: flex is used to build **(state tables of) DFA for the scanner** from **regular expressions / definition of tokens**
Part C: bison is used to build a **LR parser** from **grammar of language**
Part D: inputs ∈ Follow(A)
Part E: reduction step

Problem 2 [7]

Part A:
String of length zero or more of alternating a's & b's beginning with either a or b and ending with either a or b.



Part B:

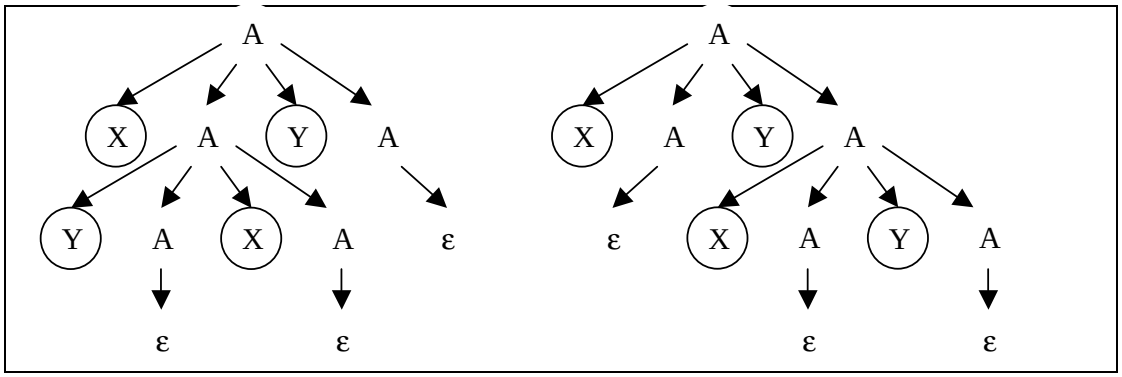
Problem 3 [10]

	a	b
{1,2,4,5}	{3,5}	{2,4,5}
{2,4,5}	{3,5}	-
{3,5}	-	{2,4,5}

Problem 4 [5]

consider string 'xyxy'

There’re 2 different parse tree for the same string, so this grammar is ambiguous.



Problem 5 [15]

Part A:
A → BAyP | CP
P → xyP | ε
B → xQ
Q → zxQ | ε
(C remains same)

Part B:

first(A)={x,y,w,z}
first(B)={x}
first(C)={w,y,z}
first(P)={x, ε}
first(Q)={y, ε}

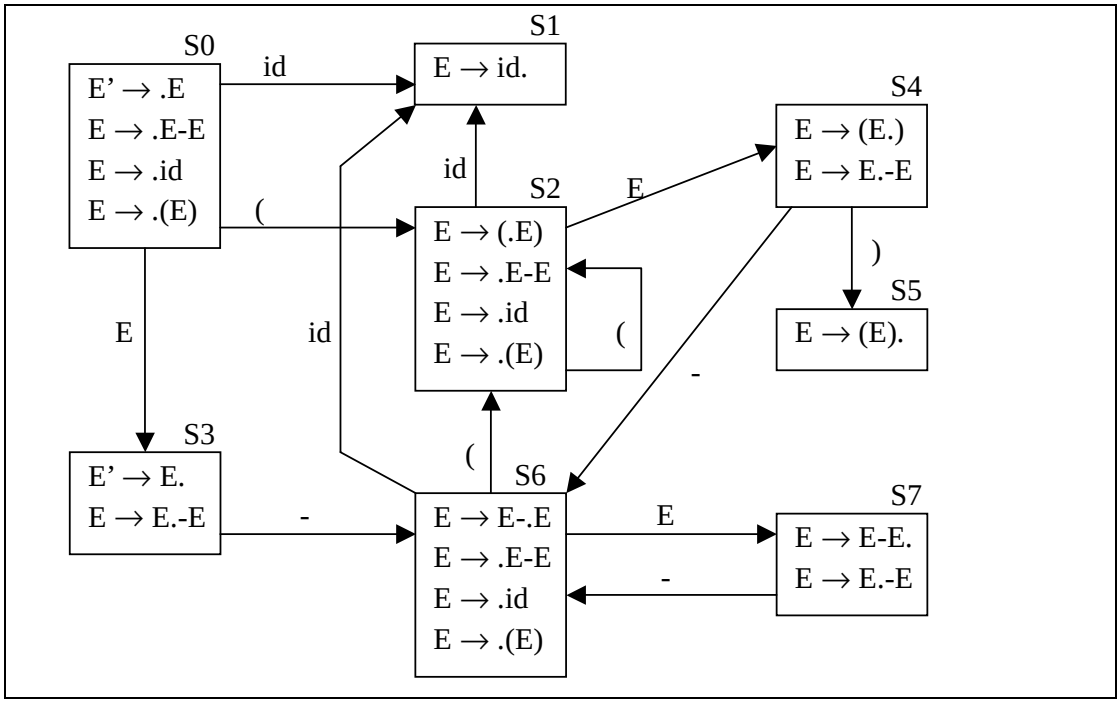
follow(A)={$,y}
follow(B)={x,y,w,z}
follow(C)={x}
follow(P)={$,y}
follow(Q)={x,y,w,z}

	x	y	w	z	$
A	BAyP	CP	CP	CP	
P	xyP	ε			ε
B	xQ				
Q	ε	ε	ε	ε / **zxQ**	
C		yC	wC	z	

Conflict: marked by red

Problem 6 [23]

Part A:



Part B:

(1) E' → E

(2) E → E - E

(3) E → id

(4) E → (E)

	id	(	)	-	$	E
0	s1	s2				s3
1			r3	r3	r3	
2	s1	s2				s4
3				s6	r1	
4			s5	s6		
5			r4	r4	r4	
6	s1	s2				s7
7			r2	**s6 / r2**	r2	

Conflict: marked by red

Part C:

because "-" is left associative

therefore it must first be reduced using rule 2

Problem 7 [10]

$S \rightarrow A$ { S.rm = A.rm; }
$A \rightarrow A_1xy$ { A.rm = ‘y’; }
| BA_1y { A.rm = ‘y’; }
| C { A.rm = C.rm; }
$B \rightarrow B_1z$ { B.rm = ‘z’; }
| x { B.rm = ‘x’; }
$C \rightarrow wC_1$ { C.rm= ‘z’; }
| y C_1 { C.rm= ‘z’; }
| z { C.rm= ‘z’; }