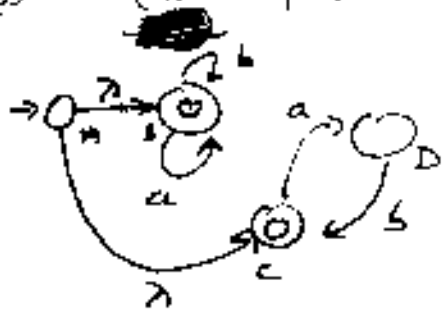
CMSC FINAL - ANSWERS
MAY 1991

1 (a) $S \to aSc \mid a$

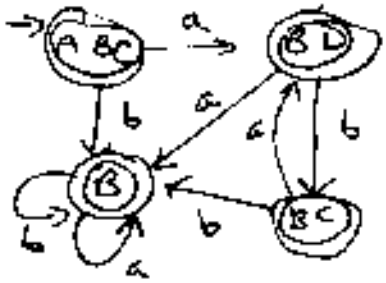
This is just odd length string of a's

$S \to aT \mid a$
$T \to aS$

(b) $(a|b)^* \mid (ab)^*$



⇐ Nondeterministic



⇐ Deterministic

Reduces to

(c) Yes - Just consists of a sequence of identifiers separated by + or *. Grammar would be:

$E \to i + E \mid i * E \mid i$

which can be made into a regular grammar easily.

note semantics changes:

2+3*4 has a different meaning, but language (eg syntax) is still recognized.

2. (a)

S0	$[S \to .X1, \perp]$	X - S1
	$[S \to .]X3, \perp]$	Y - S2
	$[S \to .Y3, \perp]$	0 - S3
	$[S \to .2Y1, \perp]$	2 - S4
	$[X \to .0, 1]$	
	$[Y \to .0, 3]$	
S1	$[S \to X.1, \perp]$	1 - S5
S2	$[S \to Y.3, \perp]$	3 - S6
S3	$[X \to 0., 1]$	1 - Reduce X→0
	$[Y \to 0., 3]$	3 - Reduce Y→0
S4	$[S \to 2.X3, \perp]$	X - S7
	$[S \to 2.Y1, \perp]$	Y - S8
	$[X \to .0, 3]$	0 - S9
	$[Y \to .0, 1]$	
S5	$[S \to X1., \perp]$	Reduce
S6	$[S \to Y3., \perp]$	Reduce
S7	$[S \to 2X.3, \perp]$	3 - S10
S8	$[S \to 2Y.1, \perp]$	1 - S11
S9	$[X \to 0., 3]$	0 - Reduce X→0
	$[Y \to 0., 1]$	1 Reduce Y→0
S10	$[S \to 2X3., \perp]$	Reduce
S11	$[S \to 2Y1., \perp]$	Reduce

No conflict - So LR(1).

(b) states S3 + S9 have same item lists, but containing them given:

$[X \to 0., 1/3]$
$[Y \to 0., 1/3]$

So ambiguous inadequate state so not LALR(1).