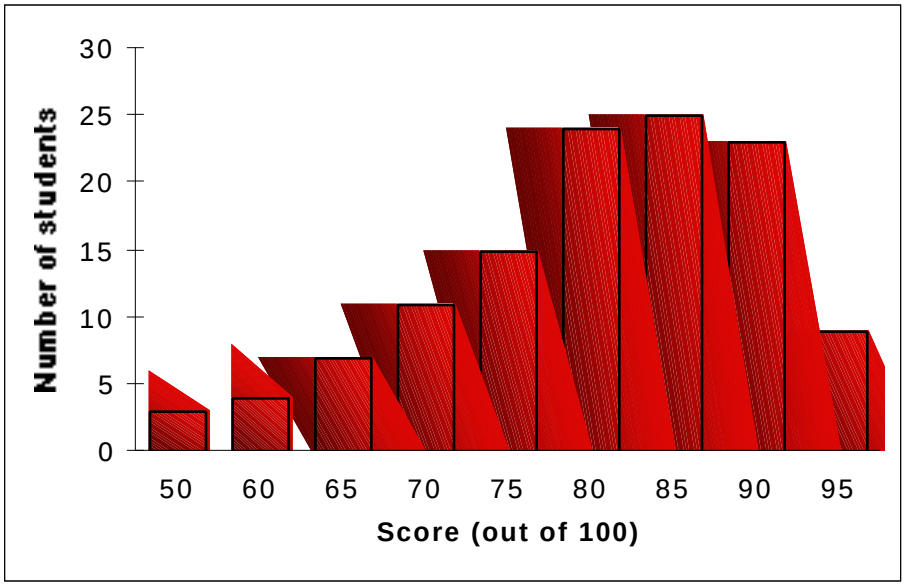
CS143 Handout #20
Autumn 2000

Midterm solution

Due to a fun Monday night effort by our staff, the midterms have all been graded and we'll hand them back at the end of Wednesday's lecture.

The performance was generally marvelous. Even though most of you stayed to the bitter end (making me very nervous in fact) you answered all the questions and apparently just hung around to double and triple check all the details (or compare answers with your neighbors? Just kidding…). Going with the modified closed book format allowed me to ask rather straightforward questions and that seemed to work well. My impression is that pretty much everyone has rather decent understanding of the material covered so far and it was only small details that tripped you up. Congratulations!

The median was 83, the mean 81, and the standard deviation was 11. I usually set the mapping for letter grades such that the median is dividing line between the highest B and the lowest B+. The midterm comprises 15% of your overall course grade.



1) a)

F If a grammar has a non-terminal `X` where `First(X)` and `Follow(X)` are not disjoint, there will be a conflict in the LL(1) parse table for this grammar.

F Every LL(1) grammar is LALR(1).

T If the items `[X ⊕•c, a]` and `[Y ←c, a/b]` are found in the same LR(1) state, there will be a reduce/reduce conflict somewhere in the parse table.

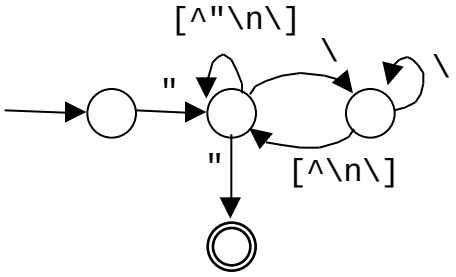
F The nested comments supported by SOOP form a regular language.

F Consider a grammar with no e-productions and no single productions (i.e. no productions with a single symbol on the right-hand side). For an input of n tokens, a bottom-up parser can make a maximum of n/2 reductions.

b)

E ← T op E | T
op ← + | - | * | /
T ← int | (E)

2) a) The loop on backslash on the far right state was optional (i.e. we accepted with or without as full credit, they would differ on how they treated the sequence \\" inside a string)



b) `q([^qb\n]|b+.)*q` or using escapes `\"([^"\n\\]|\\+.)*\"`

3)

S ← <A
A ← >B | S>B
B ← S | ∂

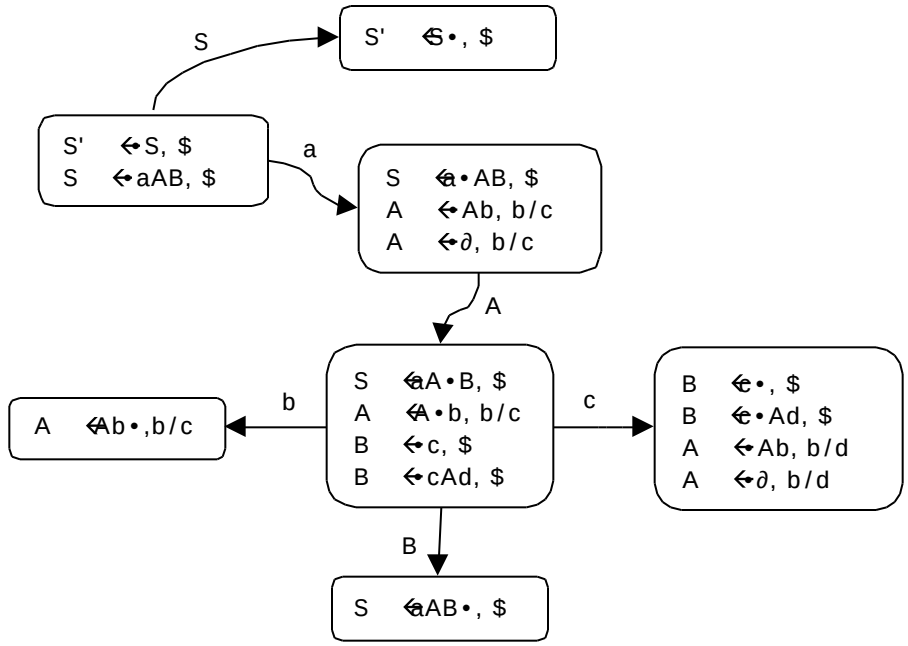
4)

	First	Follow
S	{ a b c d }	{ d e f g $ }
A	{ a b c d }	{ d e f g }
B	{ d ∂ }	{ b f }
C	{ a c }	{ e }

5)

	x	y	z	(	)	$
S	S ← xy	S ← yZ	S ← zZ	S ← (y		S ← $Z
X	X ← x			X ← (X)		
Y		Y ← yYz, Y ← ∂	Y ← ∂			Y ← ∂
Z		Z ← y	Z ← zXz			Z ← $

6)



7) a)

State	Action					Goto		
	a	b	d	e	$	S	A	B
0		s2			r5	1		3
1					accept			
2	s7	s5					6	4
3					r2			
4				s8				
5	s10						9	
6			s11					
7			r7		r6			

b) LR(1).

c) No, the LALR(1) parses merges states 7 and 10 and introduce a reduce/reduce conflict on input $. It will have one fewer row and a conflict in that row.

d) Yes, the merged lookaheads end up recreating the full follow set for every non-terminal.

8) It turns out, through some weird chain of historical events, Stanford and the UC system (via the "Big Four") actually may some legal claim to the streets. It is still being tossed around the Nevada court system.