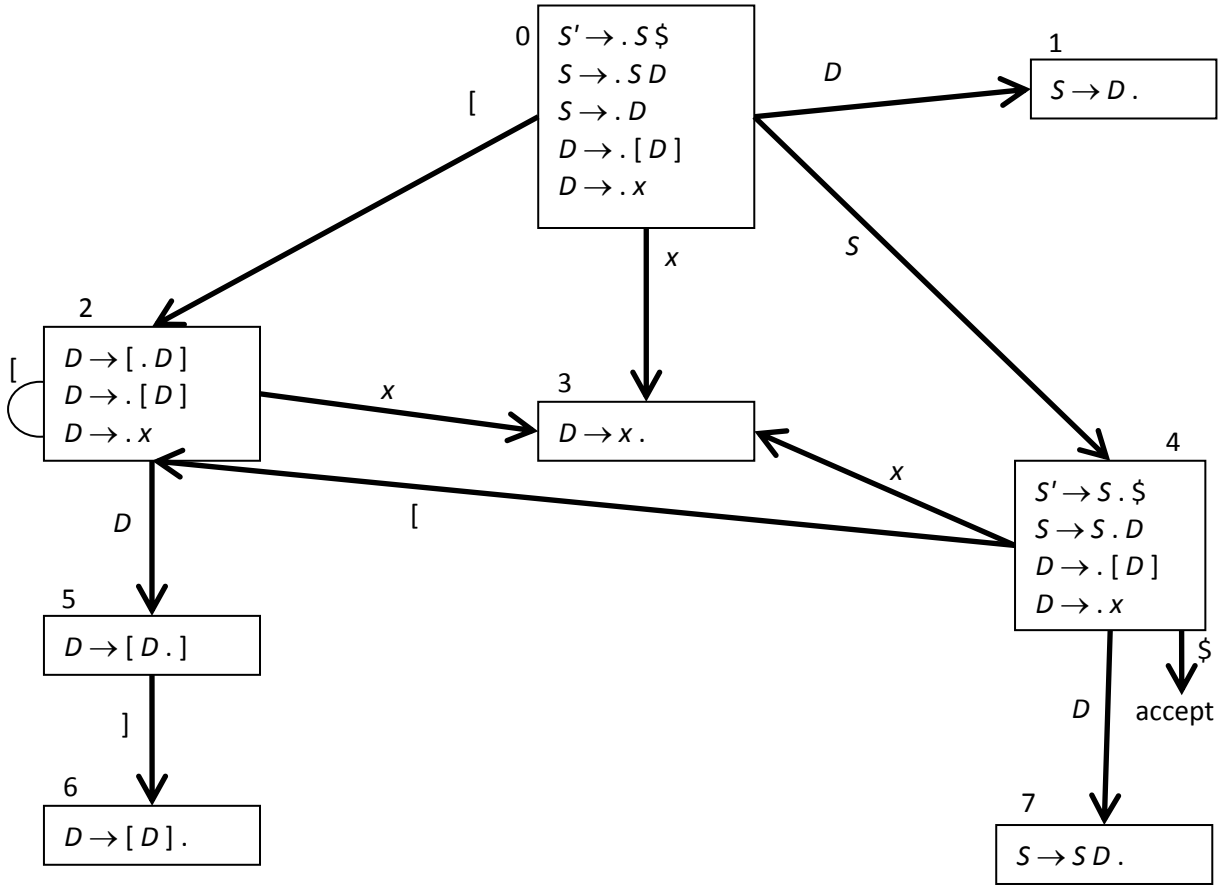
Problems 2: Bottom-up parsing

1. Construct the LR(0) automaton for the following grammar. The start symbol is *S'* and the other non-terminal symbols are *S* and *D*.

   1. $S' \rightarrow S\ \$$
   2. $S \rightarrow S\ D$
   3. $S \rightarrow D$
   4. $D \rightarrow [\ D\ ]$
   5. $D \rightarrow x$



2. Construct the GOTO and ACTION tables for the grammar of Q1.

GOTO	S	D
0	4	1
2		5
4		7

ACTION	**x**	**[**	**]**	**$**
0	s3	s2		
1	r3	r3	r3	r3
2	s3	s2		
3	r5	r5	r5	r5
4	s3	s2		acc
5			s6	
6	r4	r4	r4	r4
7	r2	r2	r2	r2

3. For the grammar in Q1, apply the LR(0) parsing algorithm on the string

x[x]$

For each parsing step show the stack, the input, action, and output.

Stack	Input	Action	Output
0	x[x]$	s3	
0 3	[x]$	r5	$D \rightarrow x$
0 1	[x]$	r3	$S \rightarrow D$
0 4	[x]$	s2	
0 4 2	x]$	s3	
0 4 2 3	]$	r5	$D \rightarrow x$
0 4 2 5	]$	s6	
0 4 2 5 6	$	r4	$D \rightarrow [\ D\ ]$
0 4 7	$	r2	$S \rightarrow S\ D$
0 4	$	acc	