CS3133

HW#8

DUE: Tuesday, October 12

1. (6 points) ***a*** Show the values of the different $T_{ij}, 1 \le i \le j \le 3$ when using the CKY algorithm to test if the string 001 can be generated by the grammar

$$S \to SA|1|AB$$
$$A \to 0|SS|SA \quad .$$
$$B \to SA|0|1$$

b Show the values of the different $T_{ij}, 1 \le i \le j \le 3$ when using the CKY algorithm to test if the string 101 can be generated by the grammar

$$S \to SA|1|AB$$
$$A \to 0|SS|SA$$
$$B \to SA|0|1$$

and show a parse tree.

2. (10 points) Which one of the following two sets is r.e.? Justify your answer by giving a proof that it is r.e.

$\{M \mid L(M)$ contains at least 42 elements$\}$
$\{M \mid L(M)$ contains at most 42 elements$\}$

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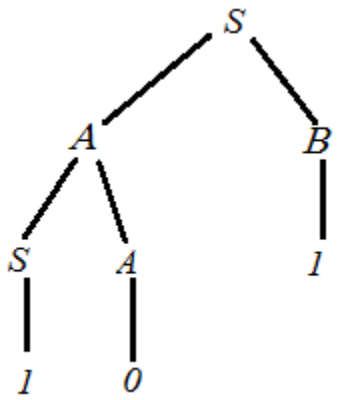
Solutions to HW#8

1. ***a***

$$T_{11} = \{A, B\} \quad T_{22} = \{A, B\} \quad T_{33} = \{S, B\}$$
$$T_{12} = \{S\} \quad T_{23} = \{S\}$$
$$T_{33} = \varnothing$$

b

$$T_{11} = \{S, B\} \quad T_{22} = \{A, B\} \quad T_{33} = \{S, B\}$$
$$T_{12} = \{S, A, B\} \quad T_{23} = \{S\}$$
$$T_{33} = \{S, A\}$$



2. $\{M \mid L(M)$ contains at least 42 elements$\}$ is r.e. To enumerate it, we dovetail over all the machines

	1	2	3	4	5	6....	t (steps of simulation)
M_0	1	2	4	7	11		
M_1	3	5	8	12			
M_2	6	9	13				
M_3	10	14					

For the t steps of the simulation of M_i we dovetail over the inputs

	1	2	3	4	5	6....	t (steps of simulation)
y_0	1	2	4	7	11		
y_1	3	5	8	12			
Σ^* y_2	6	9	13				
y_3	10	14					

If we determine that M_i accepts 42 inputs, we list it.