

CS 302
QUIZ 6

26 April 2023

ANSWERS

(a)(3 pts) See the relevant slide.

(b)(7 pts) $L = \{w \in \{0,1\}^* \mid 0^n 1^m, 0 \leq n \leq 2m\}$.

To start with : $S \rightarrow (S1 \mid 0S1 \mid 00S1 \mid e)$ to be converted to CNF.

(i) Eliminate null productions $S \rightarrow (S1 \mid 0S1 \mid 00S1 \mid 1 \mid 01 \mid 001)$

(ii) No unitary productions and useless symbols : $S \rightarrow (S1 \mid 0S1 \mid 00S1 \mid 1 \mid 01 \mid 001)$

(iii) Non-terminal substitutions:

$S \rightarrow (S \text{ one} \mid \text{zero } S \text{ one} \mid \text{zero zero } S \text{ one} \mid 1 \mid \text{zero one} \mid \text{zero zero one}) ;$

$\text{one} \rightarrow 1 ; \text{zero} \rightarrow 0$

(iii) Binary RHS and CNF :

$S \rightarrow (S \text{ one} \mid \text{zero } A \mid \text{zero } B \mid 1 \mid \text{zero one} \mid \text{zero } C) ;$

$\text{one} \rightarrow 1 ; \text{zero} \rightarrow 0 ; A \rightarrow S \text{ one} ; B \rightarrow \text{zero } A ; C \rightarrow \text{zero one}$