

CS312 Exam 2 (Part B)

18. Implement only Step 2 (removal of all ϵ -rules) of the procedure to convert CFGs to CNF. **Circle** your final set of grammar rules. **Note:** a,b, and ϵ are the only terminals. Show all work for full credit. (10 points)

$$\begin{aligned} S_0 &\rightarrow S \\ S &\rightarrow S A \mid B a \\ A &\rightarrow S \mid B \\ B &\rightarrow b \mid \epsilon \end{aligned}$$

19. Implement only Step 3 (removal unit rules) of the procedure to convert CFGs to CNF. **Circle** your final set of grammar rules. **Note:** a,b, and ϵ are the only terminals. Show all work for full credit. (10 points)

$$\begin{aligned} S_0 &\rightarrow A A S \mid A \mid b \\ S &\rightarrow A A S \mid A \mid b \\ A &\rightarrow S B \\ B &\rightarrow A \mid b \end{aligned}$$

(over)

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20. Implement only Step 4 (final conversion) of the procedure to convert CFGs to CNF. **Circle** your final set of grammar rules. **Note:** a,b, and ϵ are the only terminals. Show all work for full credit. (12 points)

$$S_0 \rightarrow S A A \mid B a \mid b$$

$$S \rightarrow S A A \mid B a \mid b$$

$$A \rightarrow S B \mid B b$$

$$B \rightarrow b$$