

CS3133

HW#6

DUE: Thursday, September 30

1. (18 points) In the interest of context free languages being easy to parse and unambiguous, a certain CS professor proposes that all CFGs be put into *KNF*, *Kinicki Normal Form*. A CFG $G = (N, \Sigma, P, S)$ is in KNF if every production is of the form $A \rightarrow aw$ where $A \in N, a \in \Sigma, w \in N^*$ and each pair (A, a) occurs in at most one such production.

a Give a grammar in KNF to generate $\{0^n 1^n \mid n \geq 1\}$.

b Is every grammar in KNF unambiguous? Justify your answer.

c Professor Kinicki claims that for every CFL L , there is a CFG G in KNF such that $L = L(G)$. Either prove that he is correct or show that he is wrong.

2. (8 points) A CFG is in *Agü Normal Form (ANF)* if every production is of the form $A \rightarrow aB$ or $A \rightarrow Ba$ or $A \rightarrow \varepsilon$ for $A, B \in N, a \in \Sigma$. Prove or give a counterexample to the following.

CONJECTURE: A CFL is regular if and only if there is a CFG in ANF to generate it.

3. (5 points) Convert the CFG G with productions

$$S \rightarrow ASA \mid A \mid \varepsilon \mid 0$$

$$A \rightarrow 00 \mid \varepsilon$$

to a CFG \widehat{G} in Chomsky Normal Form such that $L(\widehat{G}) = L(G) - \{\varepsilon\}$.