Assignment 7  
Computer Science 235

Reading. Sections 4.1 and 4.2

1) Consider the problem of determining whether a DFA and a regular expression are equivalent. Express this problem as a language and show that it is decidable.

2) Let $A_{\varepsilon_{CFG}} = \{<G> | G \text{ is a CFG that generates } \varepsilon\}$. Show that $A_{\varepsilon_{CFG}}$ is decidable.

3) Let $\Psi$ be the set of all infinite sequences over $\{0, 1\}$. Show that $\Psi$ is uncountable using a proof by diagonalization.

4) Let $A = \{<R, S> | R \text{ and } S \text{ are regular expressions and } L(R) \subseteq L(S)\}$. Show that $A$ is decidable.

5) Let $R$ be a regular expression. Show that the problem of determining whether a CFG generates some string in $L(R)$ is decidable.