CSCI 2400 – Models of Computation

Homework 4

Problem 1 (Grammars). Give context-free grammars for the following languages (where \( n, m, k \geq 0 \)):

(a) \( L = L\{a^nb^m : n = 2m + 1\} \).

(b) \( L = L\{a^nb^m : n \neq 2m + 1\} \).

(c) \( L = L\{a^nb^mc^k : k = 2(n + m)\} \).

(d) \( L = \{\text{all regular expressions on } \Sigma = \{a,b\}\} \).

Problem 2 (Ambiguity).

(a) Show that the following grammar is ambiguous: \( S \rightarrow aaSbbS | bbSaaaS | \lambda \)

(b) Is it possible for a regular grammar to be ambiguous? Explain your answer.