

CMSC 330 practice homework on Grammars

Do NOT turn in your solutions—this homework is only for practice

1. Given the regular grammar:

$$S \rightarrow aT \mid bS \mid a$$

$$T \rightarrow aS \mid bT \mid b$$

(a) Give a leftmost derivation that shows S produces $abaabb$

(b) Draw the parse tree for $abaabb$

(c) Give a DFA that recognizes the same language

(d) Give a regular expression for this set.

2. Give grammars for each of the following:

(a) $\{a^{3n}b^{2n} \mid n > 0\}$

(b) $\{a^{3n}b^{2m} \mid m, n > 0\}$

(c) $\{a^{2n}b^{m+n}c^m \mid m, n > 0\}$

(d) $\{a^m b^n c^p d^q \mid m+n = p+q\}$

(d) $\{a^m b^n \mid m \neq n, m, n > 0\}$

3. Given the grammar $X \rightarrow 0X \mid X1 \mid 01$

(a) Give the parse tree for 00011111

(b) Give a regular grammar for the same language

(c) Describe the language as simply as you can as an English sentence