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) \(\{a^{m}b^{n}c^{0}d^{q} \mid m+n = p+q\}\)
   (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 0011111
   (b) Give a regular grammar for the same language
   (c) Describe the language as simply as you can as an English sentence