Exam 2 Review

List the pieces of the tuple used to define a PDA.

Prove that the following language is or is not context free:
M = { w | w contains an even number of As and an odd number of Bs }
N = { w | w contains an unequal number of As and Bs }

How are language M and N related?

Describe, using a few English sentences, the main concept that allows the 2nd pumping lemma to work (or, why is pumping involved at all?) and how it's different from the 1st pumping lemma.

Why is a the following string, s, useless in applying the pumping lemma for the following language $L = \{a^n b^n | n > 0\}$ s = aabb

Prove that the following language is or is not context free:
L = {w | w contains more As than Bs }
M = { w | w contains an unequal number of As and Bs, and twice as many Cs as Ds }
N = { w | w contains an unequal number of As and Bs, and twice as many Cs as Ds , and more Ds than As}

Build a PDA that recognizes this language: L= $\{a^{2*n} b^n | n \geq 0\}$
Build a CFG that recognizes the above language. Using your grammar above, build the parse tree for: aaaabb

Build a PDA and CFG that recognizes the following language. Build the parse tree for
aaaaaabbb
L= $\{a^{2*n} b^n | n > 0 \ AND \ n \% 2 == 1\}$

Build a PDA and CFG for the following language or show that you can't.
L= $\{a^{2*n} b^n a^q b^{q*2} | n > 0, q > 0\}$

For each grammar you wrote above, put it in CNF.

For each grammar you wrote above, calculate FIRST and FOLLOW for each nonterminal. Which grammars are LL(1) and which are not? For those that are LL(1), build LL(1) parse tables. For those that are not LL(1), how many lookahead characters do you need to produce an unambiguous parse table?

CFLs are closed under which of the following operations: Union, Intersection, Complement, Closure (*), Concatenation. Prove your answer.