CS 303 – FLAT

Assignment: CFL, PDA

1. For the following languages, specify whether they are Regular/CFL/none and also **briefly describe the reason behind your answer**:
   (a,b,c,d are input symbols)
   (i) L= $\{a^{m+n} b^n c^m / m,n>=1\}$
   (ii) L= $\{a^m b^n c^m d^n / m,n>=1\}$
   (iii) L= $\{a^m b^n / m,n>=1\}$
   (iv) L= $\{a^m b^n / m>n\}$

2. Draw a PDA for the language L= $\{a^n b^n / n>=1\}$
3. Draw a PDA for the language L= $\{a^n b^n / n>=1\}$ U $\{a^n b^{2n} / n>=1\}$
4. For the following pairs, specify whether they are equal in terms of computation power:
   (i) DFA & NFA
   (ii) DPDA & NPDA

5. Consider the CFG with {S,A,B) as the non-terminal alphabet, {a,b) as the terminal alphabet, S as the start symbol and the following set of production rules:
   S --> aB|bA
   A --> a|aS|bAA
   B --> b|bS|aBB
   from the above rules, can we generate the string "aabbab"? if yes, in how many different ways can we generate? (show with proper derivation trees)

6. Consider the following statements about the context free grammar:
   G = {S → SS, S → ab, S → ba, S → E}
   is G ambiguous? show with proper examples.
   can G be accepted by a deterministic PDA? Explain your answer.