**Assignment 2**

1. Find a regular expression corresponding to each of the following subsets of {a, b}\*?
   1. The set of all strings containing exactly 2a's.
   2. The set of all strings containing at least 2*a*·s.
   3. The set of all strings containing the substring *aa*.
2. Show that the following languages are not regular by using pumping lemma?
   1. *L* = {*aibjck | k > i + j*}
   2. *L* = {*w* Î{*a*, *b*}\* | *w* contains an equal number of *a*'s and *b'*s}
3. Let *G* = ({*A0*, *A1*, *A2*, *A3*}, {*a*, *b*}, *P*, *A0*), where *P* consists of

*A0* → *aA0* | *bA1*, *A1* → *aA2* | *aA3*, *A3* → *a | bA1* | *bA3*, *A3* → *b | bA0*

Construct an NFA accepting *L*(*G*).

1. Find a derivation tree of *a \* b + a \* b* given that *a \* b + a \* b* is in *L*(*G*), where *G* is given by

*S*  *S + S* | *S \* S*, *S*  *a | b*

1. Consider the following productions:

*S*  *aB | bA*, *A*  *aS | bAA | a* , *B*  *bS | aBB | b*

For the string *aaabbabbba*, find

* 1. the leftmost derivation,
  2. the rightmost derivation, and
  3. the derivation or parse tree?

1. Reduce the following grammar to CNF:

*S*  *ASA | bA*, *A*  *B | S*, *B* *c*.

1. Convert the following grammars into GNF?
   1. *S*  *AB*, *A*  *BS | b*, *B*  *SA | a*
   2. *S*  *ABb | a*, *A*  *aaA*, *B*  *bAb*
2. If a context-free grammar is defined by the productions

*S*  *a | Sa | bSS | SSb | SbS*

show that every string in *L*(*G*) has more *a*'s than *b*'s?

1. What is Pushdown Automata (PDA); Formal Definition of PDA and Rules for PDA
2. Equivalence between CFG and PDA
3. How can we Convert CFG to PDA show with example

**Assignment instruction**

1. It is individual Assignment
2. You have to submit it before your final exam
3. Assignment plagiarism wrath zero make