94

1) a). Difference between DFA, NFA

- DFA is Deterministic Finite Automaton
- NFA is non-determined Finite Automaton. It can take multiple inputs, empty string while DFA can't.
- Terminal is non-terminal variable (context-free grammar)
- Variable is symbol.

- Terminal: certain variable or other symbols.

b) - Set is a collection things of all objects eg $S = \{3, 2, 1\}$
- Proper Subset: If A is a subset of B and not equal to B ..."

- Subset is a set contained some element of the set
  $B = \{2, 3, 4\}$ $A = \{2, 3\} \Rightarrow A \subseteq S$
- Singleton Set: is a set that has only one member.
- Predicate: a sequence of grammar.

- Power set is a set that contain all subsets of the set
  $S = \{1,2,3\}$ => Power set of $S = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$
- Node is a points in graph.
- Vertex is a node
- Edge is a line connect two nodes.
- Graph can define as (V,E) where V is a set of vertex and E is a set of edges.

2) CFG

$n = (V, \Sigma, R, S)$

V is finite set variables

Σ is finite set of variable V, terminal.

R finite set of rules

S : start variable

PDA

$n = (Q, \Sigma, T, \delta, q_0, F)$

Q finite set of states

Σ finite set of alphabets

T stack of alphabets.

δ : transition function

q_0 : start state

F finite set of accepting state $F \subseteq Q$

Regular Expression

1. $\{a\}$
2. $\{\varepsilon\}$
3. $\emptyset$
4. $R_1 \cup R_2$ where R_1 and R_2 is regular expression
5. $R_1 \circ R_2$ where R_1 and R_2 is regular expression

6. K^* is regular language.

4) a) $M = \{Q, \Sigma, \delta, q_0, F\}$

$Q = \{q_1, q_2, q_3, q_4\}$

$\Sigma = \{0, 1\}$

$\delta =$

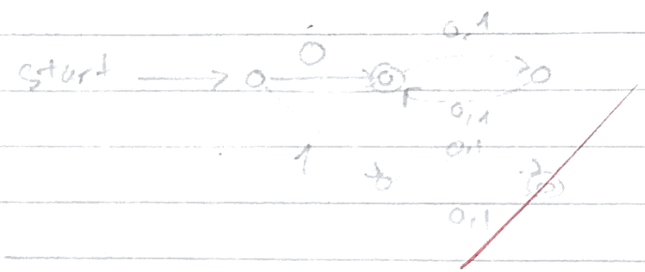
	0	1
q_1	q_1	q_2
q_2	q_1	q_3
q_3	q_1	q_4
q_4	q_4	q_4

$q_0 = q_1$ (start state)

$F = \{q_1, q_2, q_3\}$ (accepting state)

b) $L = \{w \mid w$ has at most two 1's $\}$

3)



5) PDA is a context-free grammar which very similar to DFA that using stack.

PDA can accept and recognize regular languages and DFA can't.

6) a) if x == true

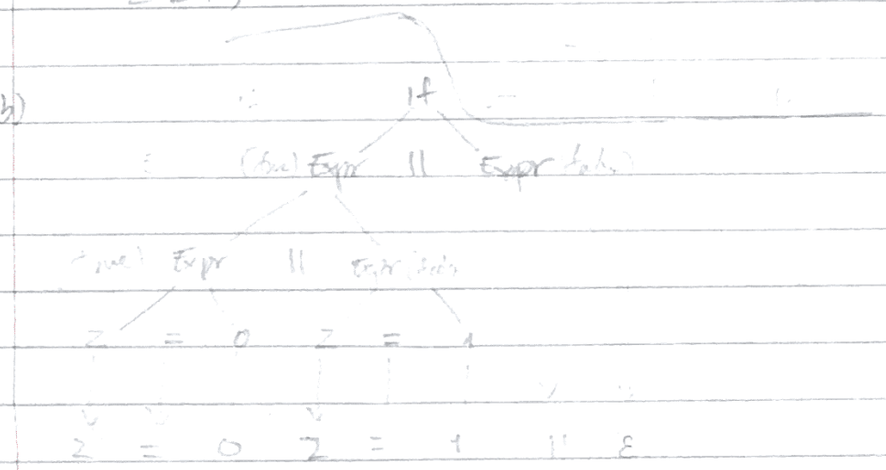
if y == true

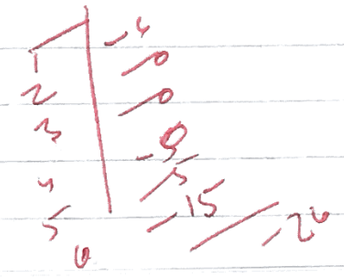
z = 0;

else

z = 1;

b)





a). $S \longrightarrow Expr$ 1A

$Expr \longrightarrow Expr\ (true)$ true

$Expr\ (true) \longrightarrow Expr\ (true)$ if

$Expr\ (true) \longrightarrow Expr\ (true\ true)$ true

$Expr\ (true\ true) \longrightarrow z$ z

$z \longrightarrow 0$ = 0

$Expr\ (true) \longrightarrow Expr\ (true\text{-}false)$ false

$Expr\ (true\text{-}false) \longrightarrow z$ z

$z \longrightarrow 1$ 1

$Expr \longrightarrow Expr\ (false)$

$Expr\ (false \longrightarrow \varepsilon$