Assignment no. 6

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Q.1.

1. $S \to 0BB$

$B \to 0S \mid 1S \mid 0$

The PDA given as

$A = \{(q), (0,1), (S, B, 0, 1), \delta, q\ S, ?\}$

The production rule S can be

$R_1 - \delta(q, \epsilon, S) = \{(q, 0BB)\}$

$R_2 - \delta(q, \epsilon, B) = \{(q, 0S) \mid (q, 1S) \mid (q, 0)\}$

$R_3 = \delta(q, 0, 0) = \{(q, E)\}$

$R_4 = \delta(q, 1, 1) = \{(q, E)\}$

Testing 0100000 against PDA

$\delta(q, 0100000, S) = \delta(q, 010000, 0BB)$

$= \delta(q, 10000, BB)$ R1

$= \delta(q\ 10000, 1S\ B)$ R3

$= \delta(q, 0000, S\ B)$ R2

$= \delta(q, 0000, 0BBB)$ R1

$= \delta(q, 000, BBB)$ R3

$= \delta(q, 00, 0BB)$ R2

$= \delta(q, 00, BB)$ R3

$= \delta(q, 00, 0B)$ R2

$= \delta(q, 00, B)$ R3

$= \delta(q, 0, 0)$ R2

$= \delta(q, \epsilon)$ R3

The 0100000 is accepted by PDA.

Q.2. Convert given CFG to CNF

$G1 = \{S \rightarrow AB,\ S \rightarrow C,\ A \rightarrow a,\ B \rightarrow b\}$

$G2 = \{S \rightarrow aA,\ A \rightarrow a,\ B \rightarrow c\}$

Step 1 : Eliminate start symbol from RHS

$S_1 \rightarrow S$

Step 2 : In grammar, remove the null, unit and useless production.

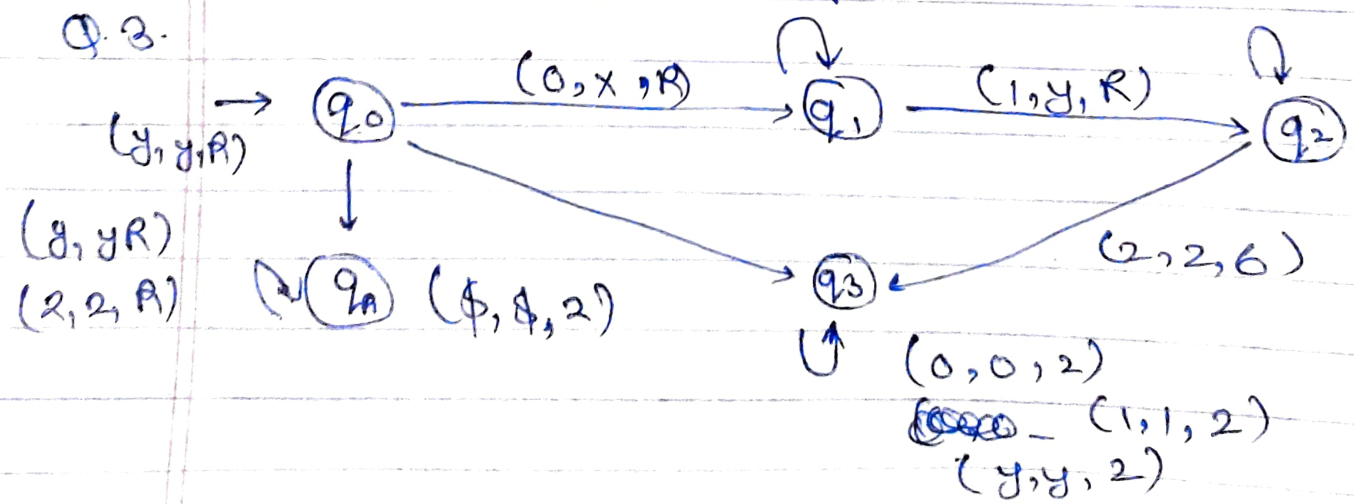
Step 3 : Eliminate terminals from the RHS of the production if they exist with other non-terminal or terminals

$S \rightarrow RA$ $\quad$ $R \rightarrow a$

Step 4 : Eliminate RHS with more than two non-terminals.

$S \rightarrow RS$ $\quad$ $R \rightarrow AS$

Q.3.



To solve this approach firstly replace one 0 from front by x, then keep moving right till we get one 1 & then replace this 1 by y. Again keep moving right till we get 2 & then replace it by z and move left.

Q4.

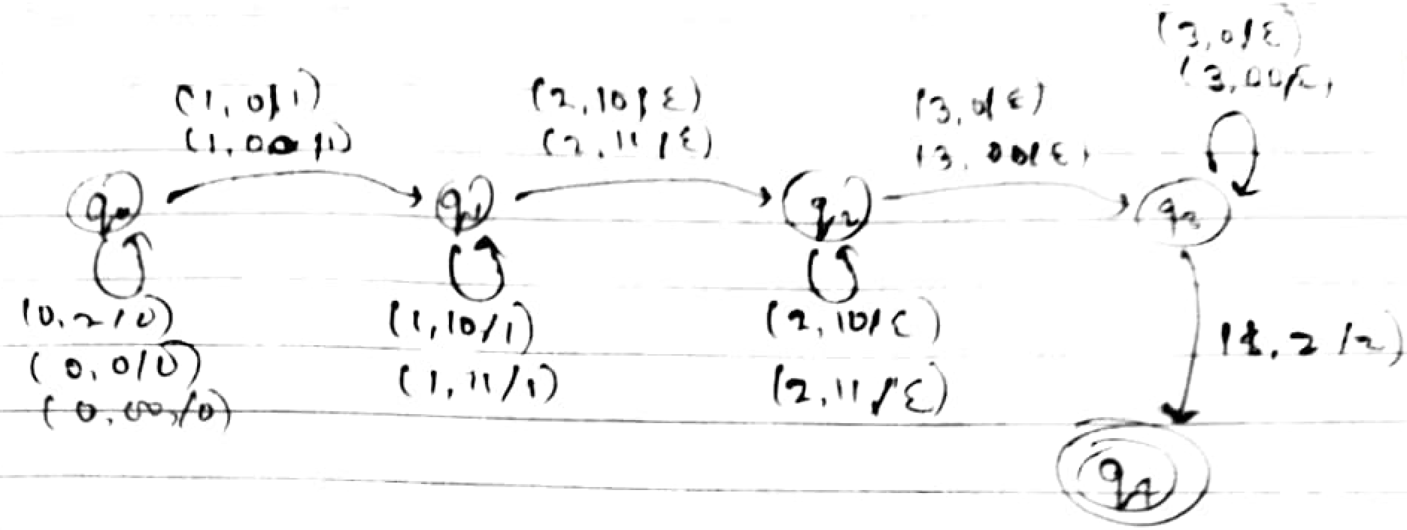
The Turing machine M can be constructed by following moves:

- Let q_1 be initial state
- If M is in q_1 on scanning x, it enters the state q_2 and write B (blank)
- If M is in q_2 on scanning x, it enters the state q_2 and write B (blank)
- From the above moves, we can observe that M enters the state q_1 if it scans an even number of x's and it enters q_2 if it scans odd number of x's. Hence q_2 is only accepting state.

Hence $M = \{\{q_1, q_2\}, \{1\}, \{1, B\}, \delta, q_1, B, \{q_2\}\}$
Where δ is given by.

Tape Alphabet Symbol	Present state q_1	Present state q_2
α	BRq_2	BRq_1

Q5



Input : 0011122233

Result : Accepted

Input : 00011 22233

Result : Not Accepted.