Question 1

Build/design a Turing machine (TM) that determines whether a given word contains at least one instance of the substring aab. If it does, then the TM should write a T on the tape after the input word.

States :

Alphabet :

Stack Alphabet:

Start State ():

Accepting State ():

Transition function (d):

Transition function (d):

δ(qStart ,a)=(qCheck1 ,a,R)

δ(qStart ,b)=(qStart ,b,R)

δ(qStart ,\_)=(qAccept ,\_,R)

δ(qCheck1 ,a)=(qCheck2 ,a,R)

δ(qCheck1 ,b)=(qStart ,b,R)

δ(qCheck1 ,\_)=(qStart ,\_,R)

δ(qCheck2 ,a)=(qCheck3 ,a,R)

δ(qCheck2 ,b)=(qStart ,b,R)

δ(qCheck2 ,\_)=(qStart ,\_,R)

δ(qCheck3 ,b)=(qWrite\_T ,b,R)

δ(qCheck3 ,a)=(qStart ,a,R)

δ(qCheck3 ,\_)=(qStart ,\_,R)

δ(qWrite\_T ,\_)=(qWrite\_T ,T,R)

δ(qWrite\_T ,any)=(qWrite\_T ,same symbol,R)

Question2

Build/design a TM that:

· accepts all words that start with an a, and ends with a b,

· loops forever on all words that start with a b, and

· rejects all other words.

Question 3

Build a 2PDA that accepts the language

States :

Alphabet :

Stack Alphabet:

Start State ():

Accepting State ():

Transition function (d):

d

d

d

d

d

d

d

d

Question 4

Build a Turing Machine that:

· accept even number of as,

· loops forever if start with b, and

· rejects all other words.

States :

Alphabet :

Stack Alphabet:

Start State ():

Accepting State ():

Transition function (d):

d

d

d

d

d

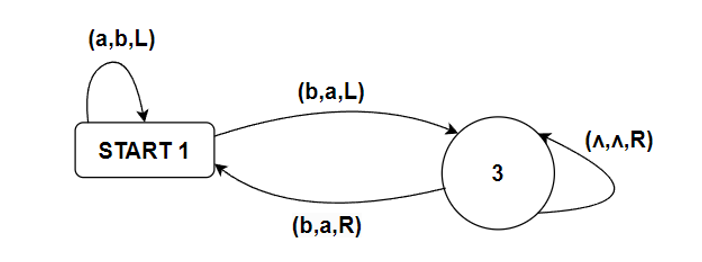
d

d

d

Question 5

Convert the following TM into summary table and then into their code words in CWL. What is the language accepted by this TM.



CWL:

(Current State, Input Symbol, Write Symbol, Move Direction, Next State)

1. (START1, a, b, L, START1)

2. (START1, b, a, L, 3)

3. (3, Λ, Λ, R, 3)

Language Accepted:

* Accepts strings ending in b
* Non-empty