

VIRTUAL UNIVERSITY OF PAKISTAN

A Good Education is a Foundation For a Better Future

CORRECT ANSWER SOLVED BY HADI
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(Final Term Past Paper)

MADE AND SOLVED BY TEAM HADI

WARNING: Team HADI is not responsible for any mistake or wrong answer. All students reading and using this document may check and confirm the answers at their own.



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Best of luck!



Which statement is true?

pg 4

Answer (Please select your correct option)

All words are strings



All strings are words

Both are always same

All letter are string

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Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

If L_1 and L_2 are expressed by r_1 and r_2 , respectively then the language expressed by $(r_1)(r_2)$ will be _____

Answer (Please select your correct option)

- Regular
- Ir-regular
- Undermined
- Such language does not exist



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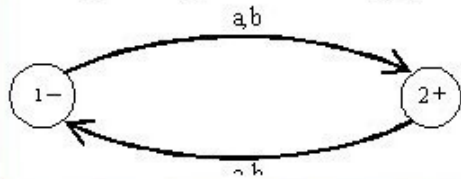
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Question No : 3 of 52

Marks: 1 (Budgeted Time 1 Min)

Below given FA generates the language having strings of _____



Answer (Please select your correct option)

ODD length



EVEN length

Equal number of a's and b's

Odd number of a's and b's

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Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

If an FA accepts no string, then language is denoted by _____

Answer (Please select your correct option)

{}



\emptyset

Both {} and \emptyset

Null

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Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)

Using tree structure, initial state can be represented by_____

Answer (Please select your correct option)

An arrow



+

-

*

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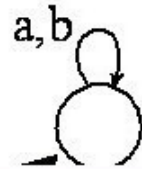
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Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

Below given FA accepts _____ language.



Answer (Please select your correct option)

Finite



Infinite

No

All

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Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

Even-palindrome is a _____ language

Answer (Please select your correct option)

non-regular



regular

regular but infinite

regular but finite

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Question No : 8 of 52

Marks: 1 (Budgeted Time 1 Min)

If L_1 and L_2 are two regular languages, then _____ is/are also regular.

Answer (Please select your correct option)

Both $L_1 \cup L_2, L_1 \cap L_2$



$L_1 \cap L_2$

$L_1 \cup L_2$

$L_1 \cap L_2$

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Question No : 9 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the language L of strings, defined over $\Sigma = \{a,b\}$, ending in a

Answer (Please select your correct option)

- There are finite many classes generated by L, so L is regular
- There are infinite many classes generated by L, so L is regular
- There are finite many classes generated by L, so L is non-regular
- There are infinite many classes generated by L, so L is non-regular



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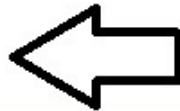
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Pumping lemma is generally used to prove that:

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Answer (Please select your correct option)

A given language is infinite



A given language is not regular

Whether two given regular expressions of a regular language are equivalent or not

A given language is finite

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Question No : 11 of 52

Marks: 1 (Budgeted Time 1 Min)

If the FA has N states, then test the words of length less than N . If any one word is accepted by this FA, then it will accept ____ word.

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Answer (Please select your correct option)

All 

not sure

No

One

Two

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Question No : 12 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following pairs of regular expressions are equivalent?

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Answer (Please select your correct option)

1(001)* and (10)*10

$x(xz)^*$ and $(x)^*x$



x^+ and x^*

x^+ and x^*x^+

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Question No : 13 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following pairs of regular expressions are not equivalent?

Answer (Please select your correct option)

$(ab)^*$ and a^*b^*

$x(xx)^*$ and $(xx)^*x$

x^+ and x^*x^+

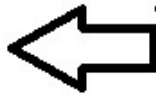
$x(x)^*$ and $(x)^*x$

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Which of the following statement is correct?

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Answer (Please select your correct option)

The length of output string is greater than length of input string in moore machine.



The length of output string is greater than length of input string in mealy machine.

The length of output string is equal to length of input string in moore machine.

The length of output string is less than length of input string in mealy machine.

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There exist _____ derivations of a certain word in ambiguous grammar.

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Answer (Please select your correct option)

more than one

Exactly one

exactly two

no



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Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

Which one of the following statements is INCORRECT:

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Answer (Please select your correct option)

$(a+b)^*aa(a+b)^*$ generates Regular language.

A language consisting of all strings over $\Sigma = \{a,b\}$ having equal number of a's and b's is a regular language

Every language that can be expressed by FA can also be expressed by RE

None of these

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We can also represent an FA using different states e.g. Accept state, Reject state, Read State etc.
The _____ state behaves as final state of an FA.

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Answer (Please select your correct option)

Accept



Pop

Push

Reject

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CYK algorithm was invented by John Cocke and later was published by ____

pg 134

Answer (Please select your correct option)

Talik Khon and Daniel H

Tandao Kasami and Daniel H

Tandao Dagger and Daniel H

Talik Khon



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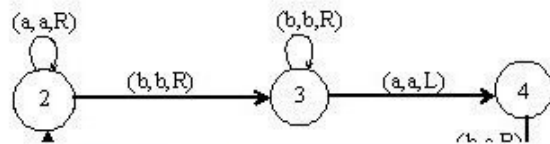
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Consider the following TM



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Answer (Please select your correct option)

Above TM accepts the non-CFL { a b c }.

Above TM accepts the non-CFL { aⁿbⁿaⁿ }.

Above TM accepts the non-CFL { aⁿbⁿ⁺²aⁿ }.

Above TM accepts the non-CFL { aⁿ⁺²bⁿaⁿ }.



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$\Sigma = \{a,b\}$ then string abbabb has length equal to _____

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Answer (Please select your correct option)

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Three

Four

Five

Six



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The language generated by CFG is called _____.

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Answer (Please select your correct option)

Infinite

Context Free Language (CFL) 

Regular

Finite

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Question No : 22 of 52

Marks: 1 (Budgeted Time 1 Min)

If r_1 and r_2 are regular expressions then $(r_1)(r_2)$ is a _____.

Answer (Please select your correct option)

RE



TG

FA

GTG

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Which of the following is RE for a language defined over $\Sigma = \{a, b\}$ having words starting with a:

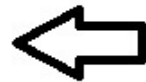
Answer (Please select your correct option)

(a + b)*

aa(a + b)+

a(a + b)*

a*(a + b)



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The _____ machine helps in building a machine that can perform the addition of binary numbers.

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Answer (Please select your correct option)

Incrementing



Complementing

Decrementing

Multiplication

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Question No : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

Left hand side of a production in Context free grammar (CFG) consists of _____.

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Answer (Please select your correct option)

One terminal

More than one terminal

One non-terminal

Terminals and non-terminals



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Question No : 26 of 52

Marks: 1 (Budgeted Time 1 Min)

A regular language _____ .

Answer (Please select your correct option)

Must be finite



Must be infinite

Can be finite or infinite

Complex Language

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If a language can be expressed by a regular expression, then its complement is _____.

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Answer (Please select your correct option)

Regular



Non Regular

Finite

Infinite

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If a given Context Free grammar (CFG) contains a production of the form $S \rightarrow \Lambda$, then _____

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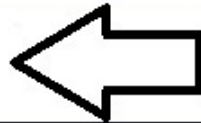
Answer (Please select your correct option)

The corresponding CFL is not empty.

The corresponding CFL is empty.

The corresponding CFL is not empty if the language is regular

The corresponding CFL is empty and non regular.



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Can a turing machine's head ever be in the same location in two successive steps?

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Answer (Please select your correct option)

Yes

Yes but only in finite languages

No



Yes but only in infinite languages

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In _____ there are Finite set of states containing exactly one START state and some (may be none) HALT states that cause execution to terminate, when the HALT states are entered.

pg 140

Answer (Please select your correct option)

TG



Turing Machine



GTG



Finite Automata



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Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following statement(s) is/are true or false?

- 1) The turing machine is similar to a finite automaton but with an unlimited and unrestricted memory.
- 2) A Turing machine is a much more accurate model of a general purpose computer.

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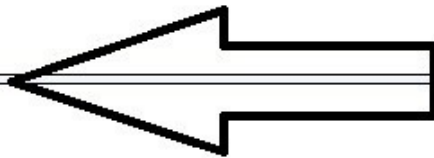
Answer (Please select your correct option)

Statement 1 is true

Statement 2 is true

Both statements (1 & 2) are false

Statement 2 is false



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We can have more than one parse trees for a given string in case of _____ Context Free Grammar (CFG).

pg 95

Answer (Please select your correct option)

vague

ambiguous

hazy

simple



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Question No : 33 of 52

Marks: 1 (Budgeted Time 1 Min)

The language of a^nb^n can be expressed by:

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Answer (Please select your correct option)

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FA

TG

GTG

PDA



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Which of the following theorem partitions Σ^* into distinct classes?

pg 73 bk

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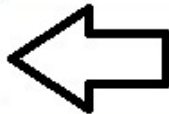
Answer (Please select your correct option)

Decidability theorem

Myhill Nerode theorem

Kleen's theorem

Emptiness theorem



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Question No : 35 of 52

Marks: 1 (Budgeted Time 1 Min)

The languages are supposed to be _____ in case of testing pumping lemma.

to prove puming lemma theorem language
is suposed to be regular at first and thn
proof it non regular by pumping lemma

Answer (Please select your correct option)

also told in the

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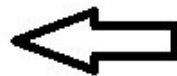
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context free

irregular

both regular and irregular

regular



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Question No : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following Context Free Grammar (CFG):

$S \rightarrow SX|XY$

$X \rightarrow ZZ$

$Y \rightarrow 1$

$Z \rightarrow 0$

Answer (Please select your correct option)

00100



0010000

001

00010

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Question No : 37 of 52

Marks: 1 (Budgeted Time 1 Min)

A read state can have _____ outgoing edge/ edges.

pg 105 book

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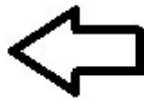
Answer (Please select your correct option)

1

2

3

Any number of



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Which of the following states do not have outgoing edges:

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Answer (Please select your correct option)

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Start

Read

Pop

Accept



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Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following Context Free Grammar (CFG):

$S \rightarrow 01A$

$A \rightarrow 10B$

$B \rightarrow 0A|11$

Answer (Please select your correct option)

011011

011011011

011001011

011001001011



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Let us consider the following Turing machine (T_M):

(y, Y, R)	(f, f, L)
(f, f, R)	(v, v, L)

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Answer (Please select your correct option)

fffggg

fffgggf

fffgg

fffggg

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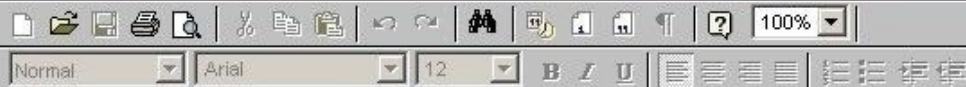
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What is meant by "Left most Derivation" in context of CFG?

Answer (Please [click here](#) to Add Answer)

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Left most derivation

Definition

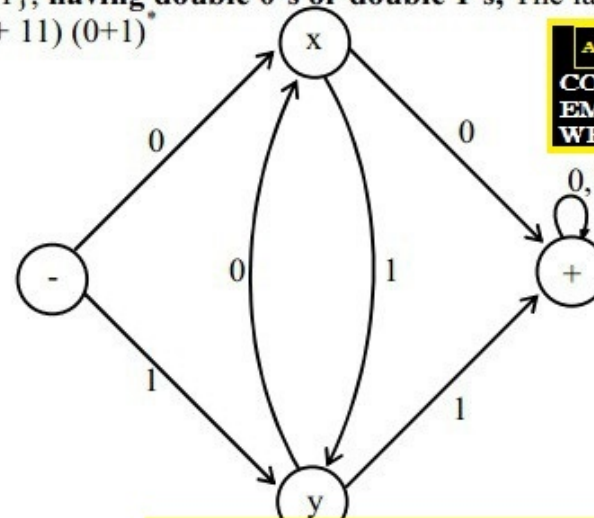
The derivation of a word w , generated by a CFG, such that at each step, a production is applied to the left most nonterminal in the working string, is said to be *left most derivation*.

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Explain the language L of string, defined over $\Sigma = \{0,1\}$, having double 0's or double 1's?

Consider the language L of strings, defined over $\Sigma = \{0, 1\}$, **having double 0's or double 1's**, The language L may be expressed by the regular expression $(0+1)^*(00+11)(0+1)^*$. This language may be accepted by the following FA



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Consider the language defined by the following regular expression:

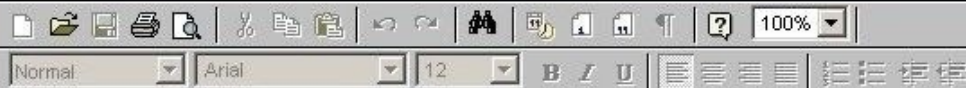
$b(a + b)^+a$

What will be the corresponding Context Free Grammar (CFG)?

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Answer (Please [click here](#) to Add Answer)



Consider the following CFG

$S \rightarrow aXb|bXa$

$X \rightarrow aX|bX|\Lambda$

The above CFG generates the language of strings, defined over $\Sigma = \{a,b\}$, beginning and ending in different letters.

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Consider live productions to be applied during derivation of a word. In your point of view what will be the ultimate result?

Answer (Please [click here](#) to Add Answer)

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It may be noted that every time a live production is applied during the derivation of a word it increases the number of nonterminals by one.

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What is meant by the following statement ?

"LANGUAGE IS CLOSED"

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Answer (Please [click here](#) to Add Answer)



$\Sigma = \{a,b\}$
productions:

$S \rightarrow SS$

$S \rightarrow XS$

$S \rightarrow \Lambda$

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Write three different parsing techniques.

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Answer (Please [click here](#) to Add Answer)

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Parsing of word

Definition

The process of finding the derivation of word generated by particular grammar is called **parsing**.

There are different parsing techniques, containing the following three

Top down parsing.

Bottom up parsing.

Parsing technique for particular grammar of arithmetic expression.

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Illustrate Decidable Problem with the help of an example.

Marks [1+2]

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Answer (Please [click here](#) to Add Answer)



Decidable problem

A problem that has decision procedure is called decidable problem *e.g.* the following problems

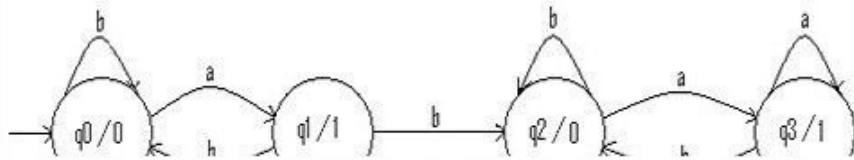
The two regular expressions define the same language.

The two FAs are equivalent.

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Consider the following Moore machine:



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Answer (Please [click here](#) to Add Answer)



Normal Arial 12 B I U

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Consider the language L which is EVEN-EVEN, defined over $\Sigma = \{a,b\}$. In how many classes does L may partition Σ^* . Explain briefly.

Answer (Please [click here](#) to Add Answer)

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No

Example

Consider the language L which is EVEN-EVEN, defined over $\Sigma = \{a,b\}$. It can be observed that L partitions Σ^* into the following four classes

C_1 = set of all strings with even number of a's and odd number of b's.

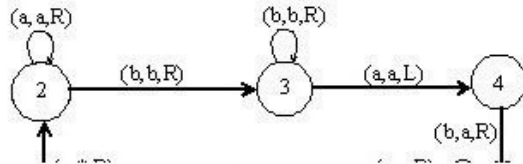
C_2 = set of all strings with odd number of a's and odd number of b's.

C_3 = set of all strings with odd number of a's and even number of b's.

C_4 = set of all strings with even number of a's and even number of b's.

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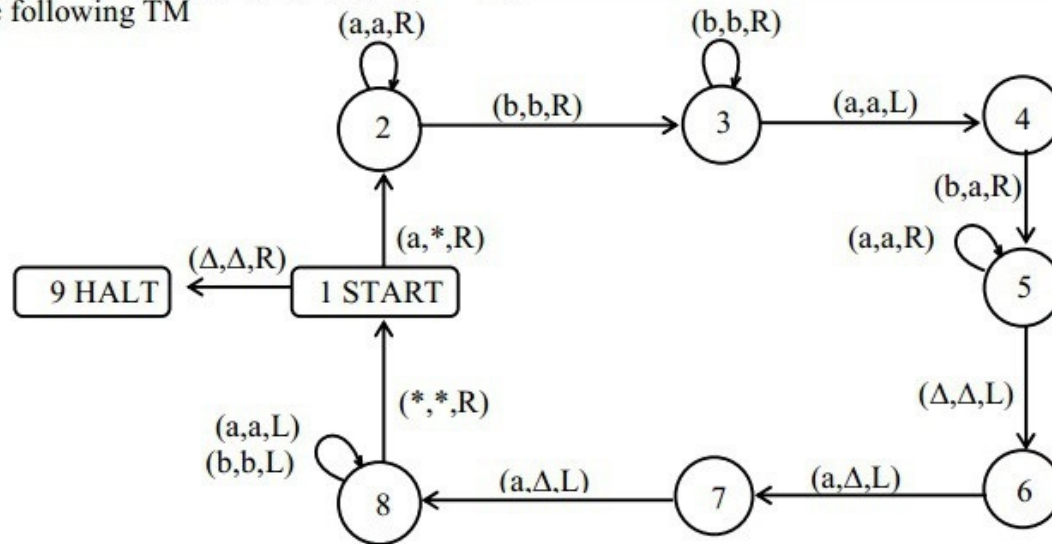
Consider the following TM



Answer (Please click here to Add Answer)

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Consider the following TM



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The string aaabbbaaa can be observed to be accepted by the above TM. It can also be observed that the above TM accepts the non-CFL $\{a^n b^n a^n\}$.

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Derive Chomsky Normal Form (CNF) corresponding to the Context Free Grammar (CFG) given below:

$$A \rightarrow BAB \mid B \mid \Lambda$$

$$B \rightarrow 00 \mid \Lambda$$

Answer (Please [click here](#) to Add Answer)

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Suppose a Maze of 20 boxes; 1 box for initial and 1 for final state. 6 boxes are for non-moveable states while the rest can be used for transitions. Draw a Nondeterministic Finite Automaton (NFA) for the given Maze.

Marks [2.5+2.5]

Answer (Please [click here](#) to Add Answer)

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