

Home Assignment-1

CS110-Theory of Computation

Last Date:31-08-2025.

Note: keep solution of home assignment in your tutorial notebook. You will be asked any time to submit it for internal evaluation.

1. Obtain the principal disjunctive normal form of the following:

(a) $P \rightarrow (P \rightarrow Q \wedge (\neg (\neg Q \vee \neg P)))$

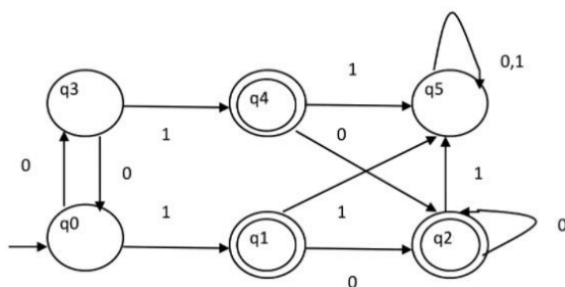
(b) $(Q \wedge \neg R \wedge \neg S) \vee (R \wedge S).$

2. Let $R = \{(1, 2), (2, 3), (1, 4), (4, 2), (3, 4)\}$ Find R^+ , R^* .

3. Construct a DFA from the NFA given below

State\Input	0	1
$q_0 \rightarrow$	$\{q_1, q_3\}$	$\{q_2, q_3\}$
q_1	q_1	q_3
q_2	q_3	q_2
$*q_3$	-	-

4. Obtain DFAs to accept strings of a's and b's having exactly one a.
5. Obtain a DFA to accept strings of a's and b's having even number of a's and b's
6. Obtain a DFA to accept strings of a's and b's starting with the string ab
7. Construct a Mealy machine that take set of all strings over alphabet $\{0, 1\}$ and make 2's complement of an input bit string in binary number.
8. Construct a Mealy machine that take set of all strings over alphabet $\{0, 1\}$ as input and produce 'E' as output if number of 1's in string mod 2=0 produce 'O' as output if number of 1's in string mod 2=1.
9. Construct a Moore machine that take set of all strings over Alphabet $\{0, 1\}$ as input and produce 'A' as output if input end with (10) or produce 'B' as output if input end with (11) otherwise produce 'C'.
10. construct a Moore machine that take set of all strings over Alphabet $\{a, b\}$ as input and print 1 as output for every occurrence of 'aab' as substring.
11. Consider the example of DFA given below:



minimize the DFA using equivalence method and by tabulation method.