

CS305 Tutorial-3

1. Construct a Mealy machine equivalent to the given Moore machine and also find language accepted by both machines.

Present state	Next state		output
	a=0	a=1	
→ q ₀	q ₁	q ₂	1
q ₁	q ₃	q ₂	0
q ₂	q ₂	q ₁	1
q ₃	q ₀	q ₃	1

2. Construct a Moore machine equivalent to the given Mealy machine and also find language accepted by both machines.

Present state	Next state			
	a=0 state	O/P	a=1 state	O/P
→ q ₁	q ₁	1	q ₂	0
q ₂	q ₄	1	q ₄	1
q ₃	q ₂	1	q ₃	1
q ₄	q ₃	0	q ₁	1

3. Construct a Mealy machine which can output EVEN, ODD according as the total number of 1's encountered is even or odd. The input symbols are 0 and 1.
4. Find the minimal DFA's for languages below and also prove that it is minimal.
- $L = \{a^n b^m : n \geq 2, m \geq 1\}$
 - $L = \{a^n : n \neq 2 \text{ and } n \neq 4\}$
 - $L = \{a^n : n \bmod 3 = 0\} \cup \{a^n : n \bmod 5 = 1\}$

5. Prove or disprove the following conjecture.
If $M = (Q, \Sigma, \delta, q_0, F)$ is a minimal DFA for a regular language L , then $\hat{M} = (Q, \Sigma, \delta, q_0, Q - F)$ is a minimal DFA for \bar{L} .

6. Let $A/B = \{w \mid wx \in A \text{ for some } x \in B\}$. Show that if A is regular and B is any language, then A/B is regular.

7. Let $B_n = \{a^k \mid k \text{ is a multiple of } n\}$. Show that for each $n \geq 1$, the language B_n is regular.

————— x —————