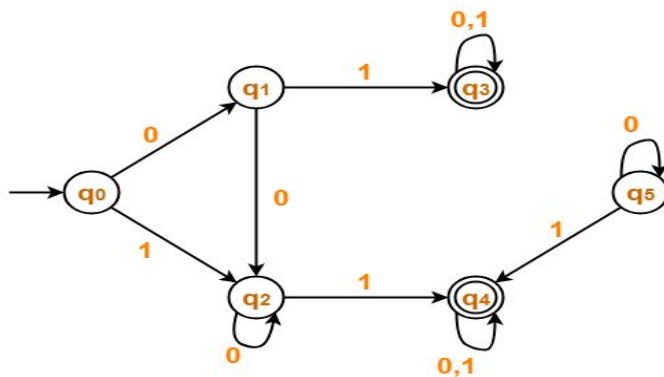


Tutorial -4 (23/9/2020)

1. Pumping Lemma is which of the following kind of tests:
 - a. Positivity
 - b. Negativity
2. Everylanguage is regular.
3. Show that the following are regular or not:
 - a. $L1 = \{a^n \mid n \geq 1\}$
 - b. $L2 = \{a^m b^n \mid m, n \geq 1\}$
 - c. $L3 = \{a^n b^n \mid n \leq 10^{10}\}$
 - d. $L4 = \{a^n b^n \mid n \geq 1\}$
 - e. $L5 = \{ww \mid w \in \{a, b\}^*\}$
4. Given a NFA with N states, the maximum number of states in an equivalent minimized DFA is at most _____.

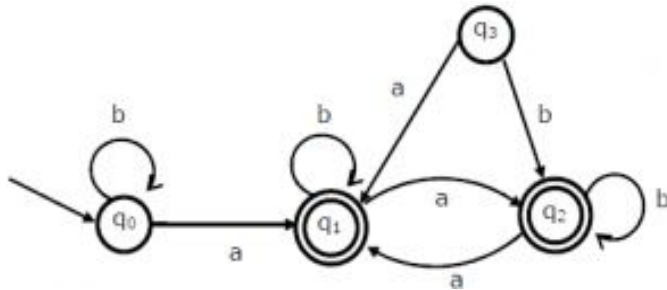
5. Minimize the given DFA:



6. If n objects are distributed over m places, and $n < m$, then some of the places receive:
 1. at least 2 objects
 2. at most 2 objects
 3. no object
 4. none of the mentioned
7. Which of the following is not an application of Pumping Lemma?
 1. $\{0^i 1^i \mid i \geq 0\}$
 2. $\{0^i x \mid i \geq 0, x \in \{0, 1\}^* \text{ and } |x| \leq i\}$

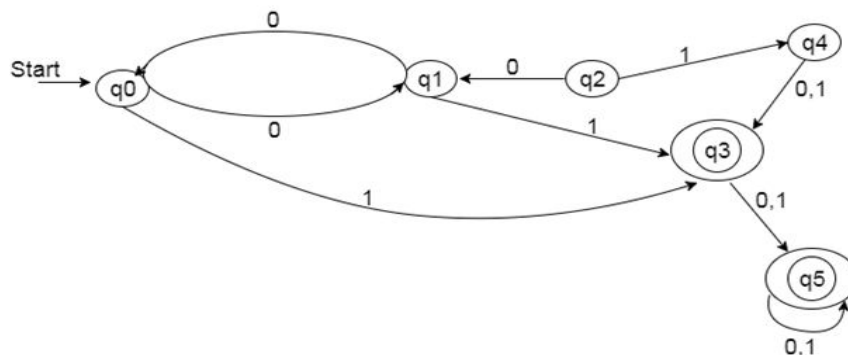
3. $\{0^n \mid n \text{ is prime}\}$
4. None of the mentioned

8. The minimum state automation equivalent to the below FSA has the following number of states?



Questions to solve within 26/9/2020 (Saturday)

1. Minimize the given DFA. All steps should be explained clearly.



2. By pumping lemma, prove that given language is not regular.

$$L = \{a^k \mid k \text{ is a prime number}\}$$

NOTE: Upload your solutions only through the given link. Name your pdf file with the format **<rollno_name_tutorialno>**. Do not mail your solutions elsewhere.

Link to upload the solutions:

https://docs.google.com/forms/d/e/1FAIpQLSf9ojnwMtKWbM9b5Jtcz_-1dDDmwsIcWB0Zw7rgPRCNip4w/viewform?usp=sf_link