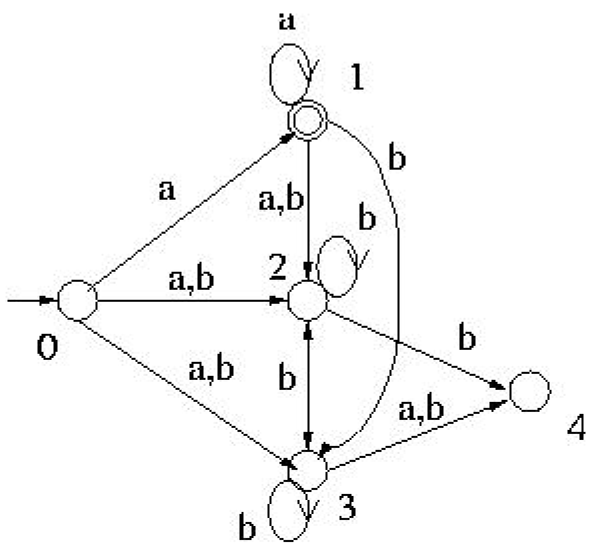
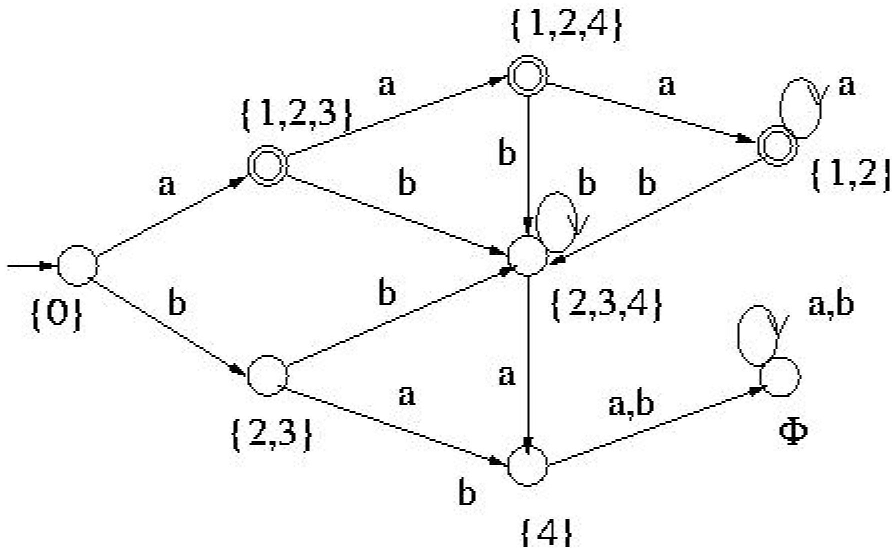
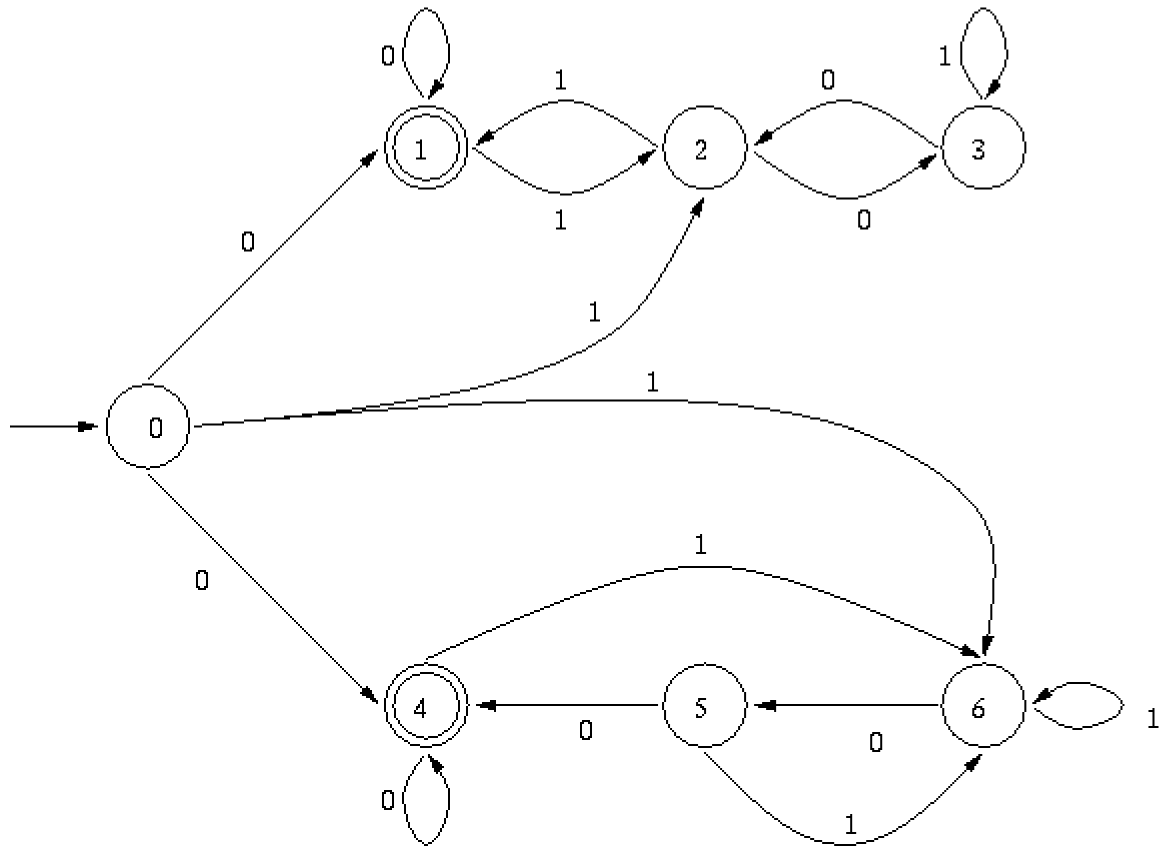
Question One: Convert the following NFA to DFA.



ANSWER:

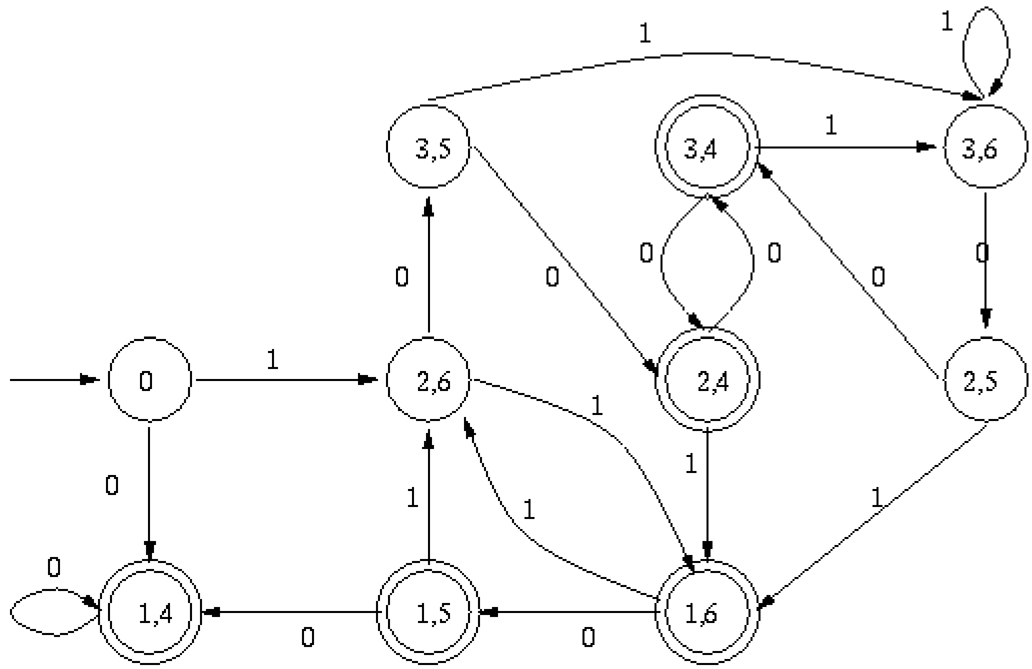


Question 2: Convert the following NFA into the equivalent DFA.



What language does this NFA accept?

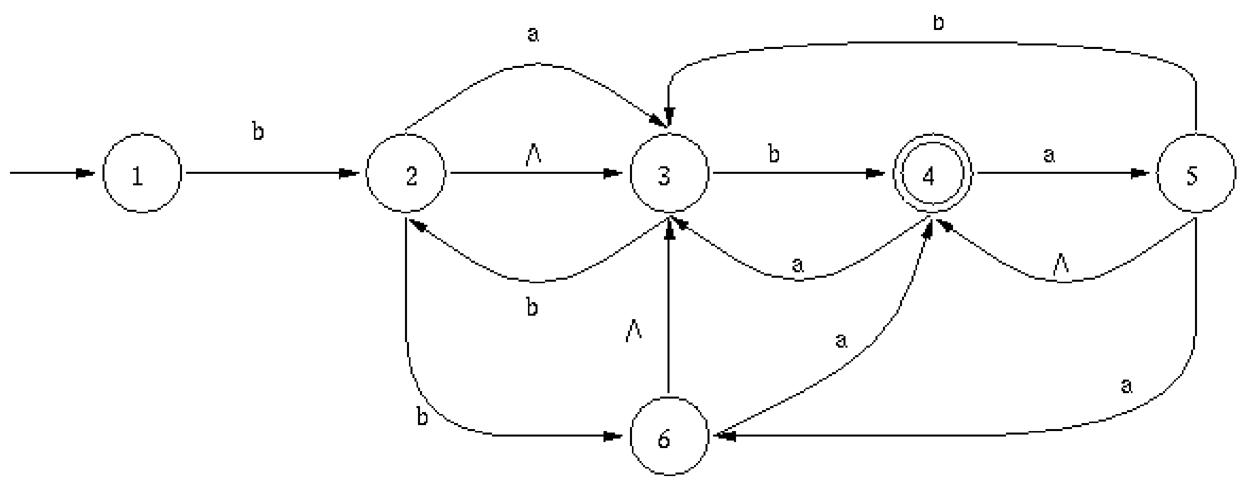
Answer:



The top half of the NFA is the `x = 0 mod 3` machine from the homework. The bottom half of the NFA is a `x = 0 mod 4` machine. The NFA is the union of these two machines. Therefore L(M)= binary strings x such that x = mod 3 or x = 0 mod 4.

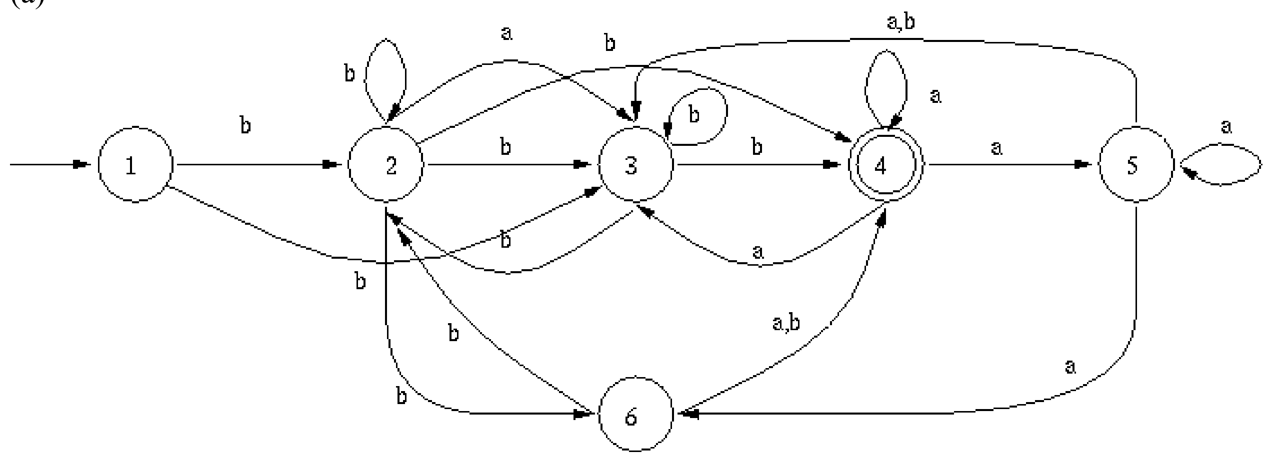
Question 3: (a) Convert the following NFA with /\ transitions into an NFA without /\ transitions.

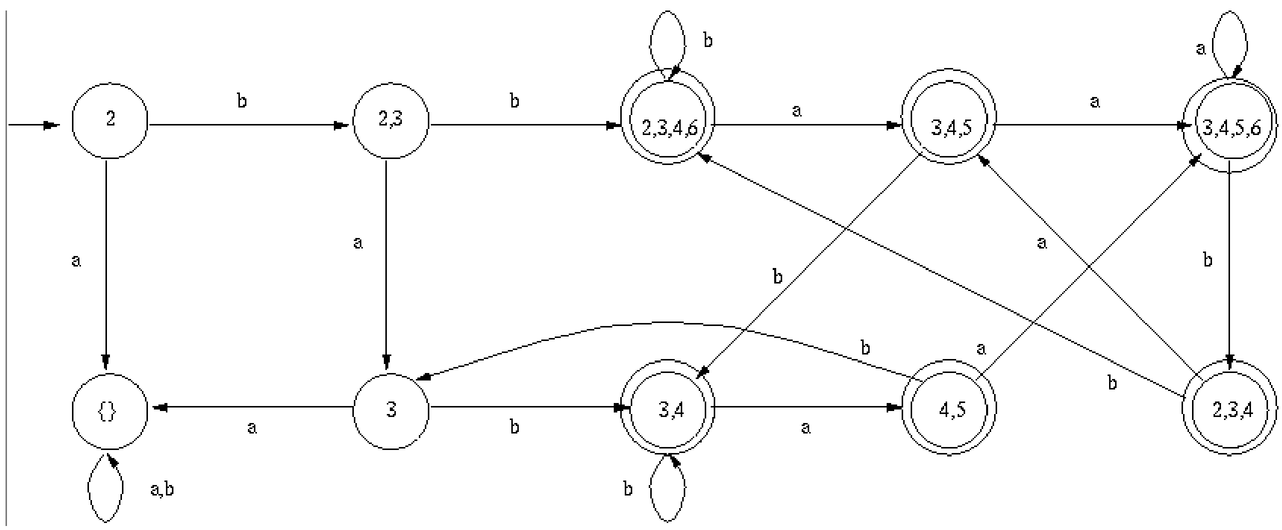
(b) Convert the NFA into a DFA.



answer 3:

(a)





Question 4:

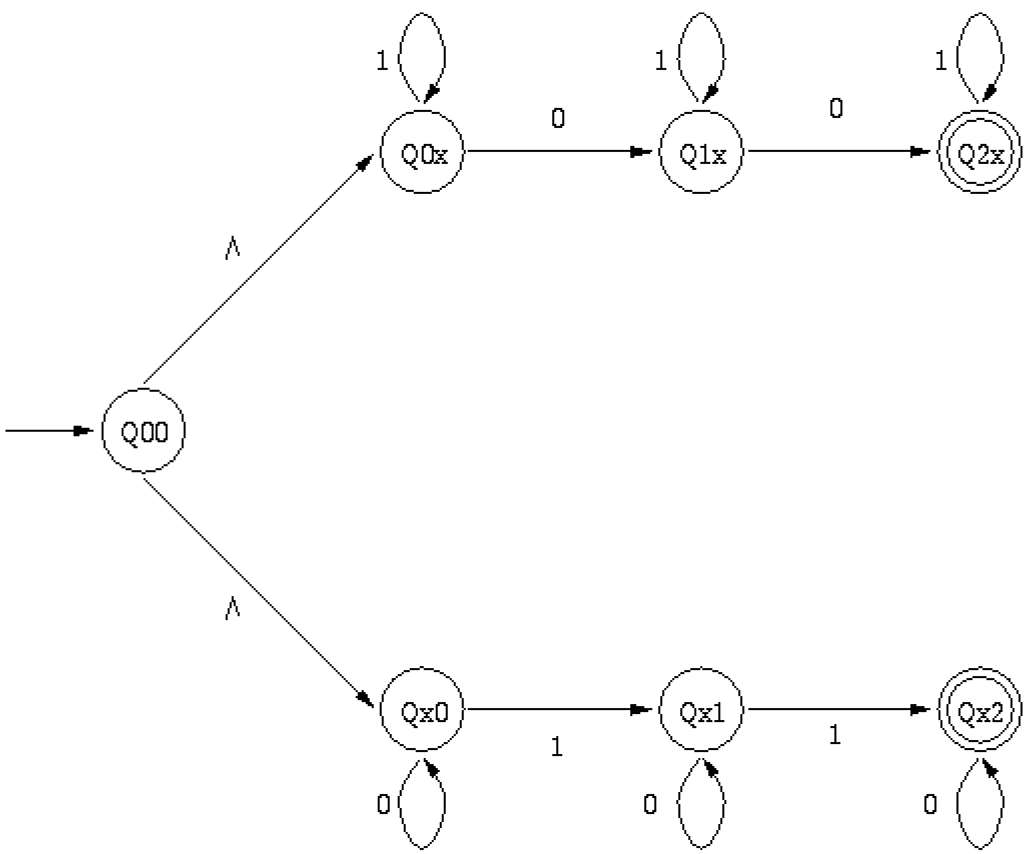
Let L_2 be the set of strings over $\{0,1\}^*$ that contain exactly 2 0's or 2 1's. Examples:

> 0011 is in L_2
> 1110011111 is in L_2
> 1000101 is not in L_2

Construct a NFA that accepts the language described in problem 2. What does each state represent?

Suppose our language was the set of strings containing exactly 3 0's or 3 1's. How many states would our NFA need?

Answer to Question 4



The state names indicate the meaning of each state. State Qx0 is the state we are in after seeing an arbitrary number of 0's and zero 1's, state Q1x is the state we are in after seeing an arbitrary number of 1's and one 0, etc.

We would only need 9 states to recognize a language consisting of strings with exactly 3 0's or 3 1's.