

Student Information

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Answer 1

a.

Table 1: Rational Numbers

	1	2	3	4	5
1	1/1	1/2	1/3	1/4	1/5
2	2/1	2/2	2/3	2/4	2/5
3	3/1	3/2	3/3	3/4	3/5
4	4/1	4/2	4/3	4/4	4/5
5	5/1	5/2	5/3	5/4	5/5

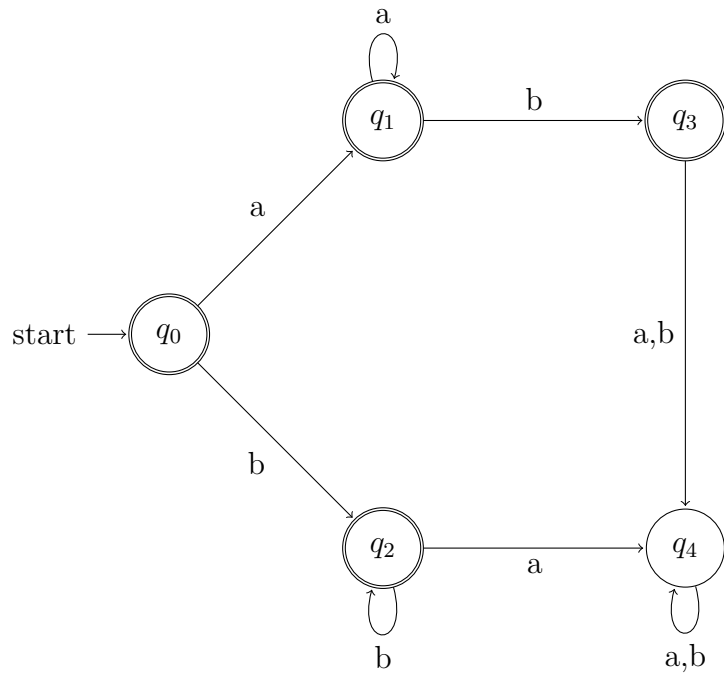
We can write set of rational numbers between (0,1) $R = 1/2, 1/3, 2/3, 1/4, 1/5, 3/4, 2/5, \dots$. Because there is one-to-one correspondence between the elements of the set R and the set of natural numbers, set of rational numbers countable and infinite. If we multiply all the members with -1, we obtain the set of rational numbers in $(-1, 0)$ which is also countable and infinite.

b.

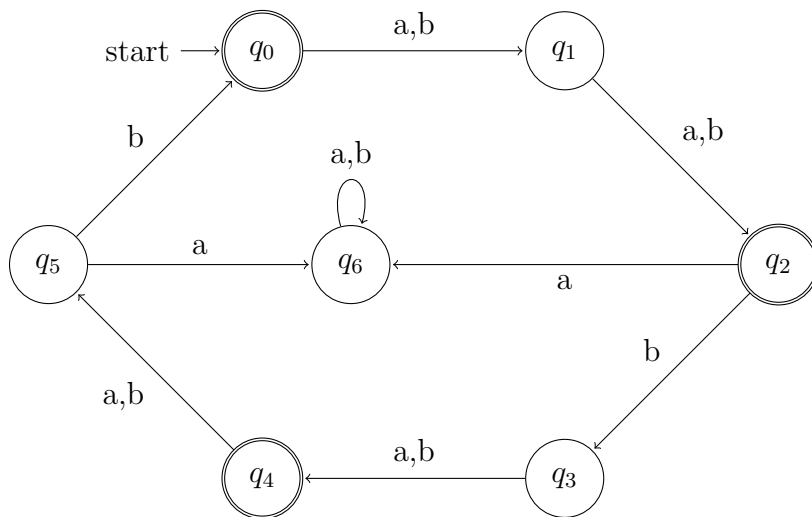
c.

Answer 2

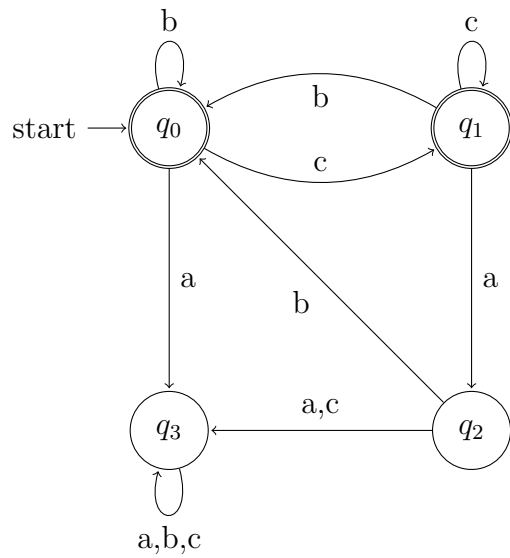
a.



b.



c.



Answer 3

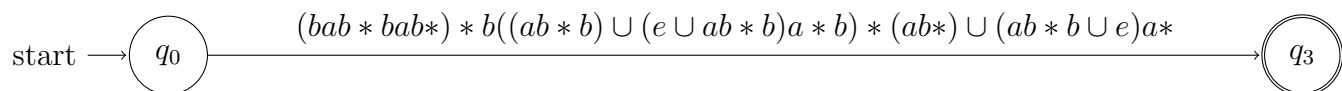
a.

w_1 is not in $L(N)$

b.

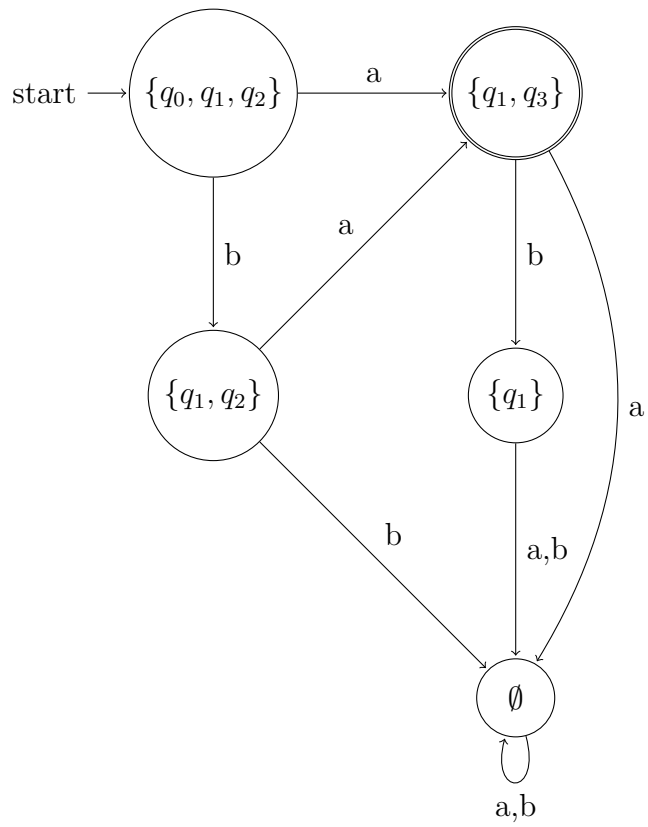
w_2 is in $L(N)$

Answer 4

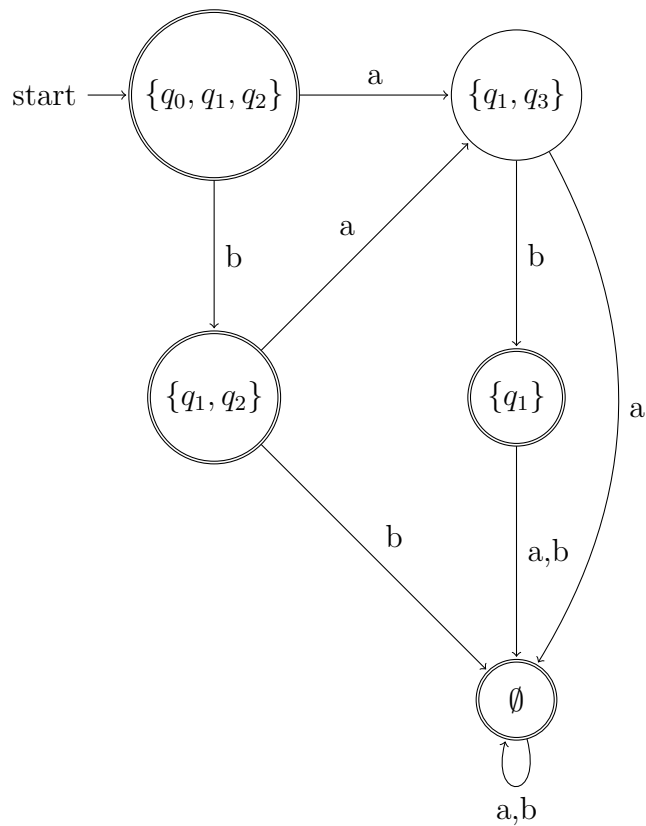


Answer 5

a.



b.



Answer 6

Answer 7

a.

Let $w = aabbaa$, which the number of a's is 4.

If we choose $x = aa$, $y = bba$, $z = a$, it becomes, $xy^i z = aa(bba)^i a$

Let $i = 2$, $xy^2 z = aabbabbaa$, the number of a's is 5 which does not meet the rule. Furthermore, the language cannot be a regular language