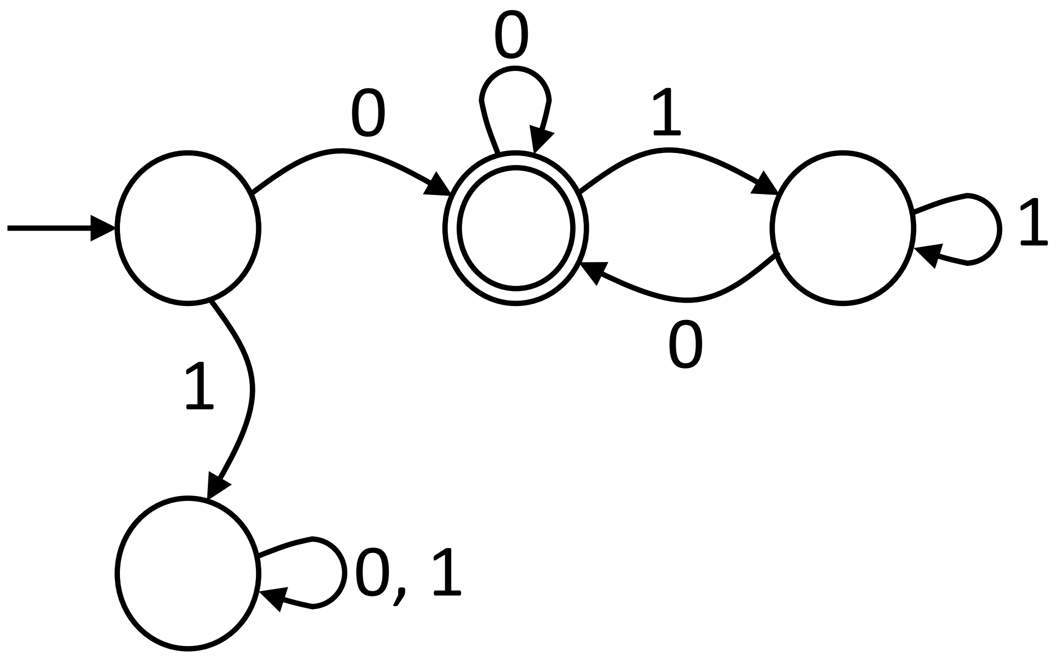
Finite Automata

CSCI 338

$\{\omega : \omega$ starts and ends with a $0\}$.



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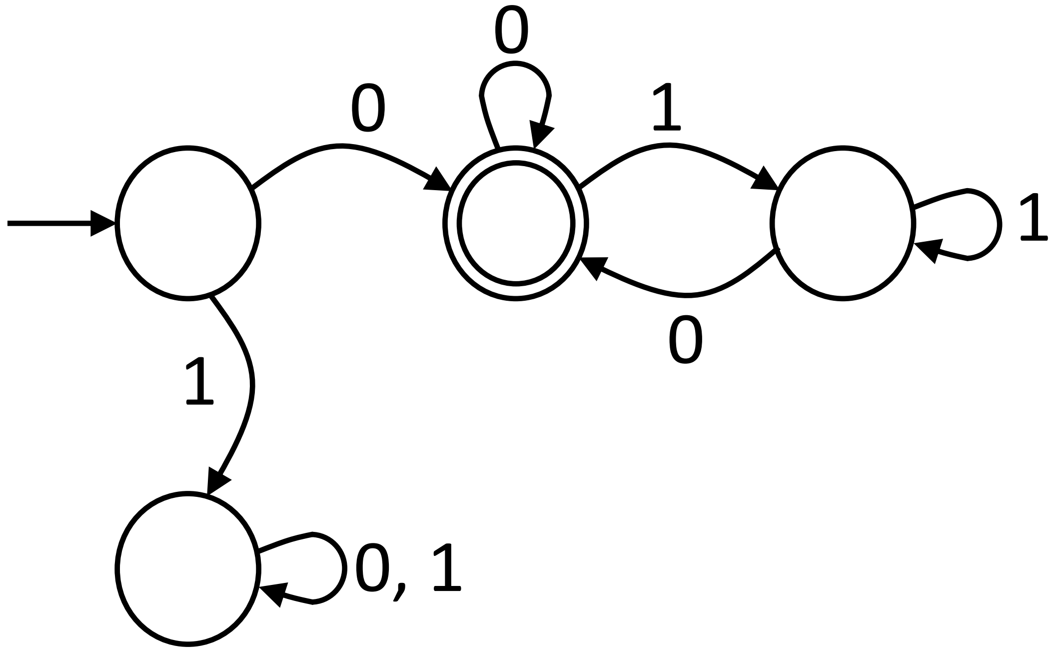

$\{\omega\colon \omega$ starts and ends with the same symbol$\}$.

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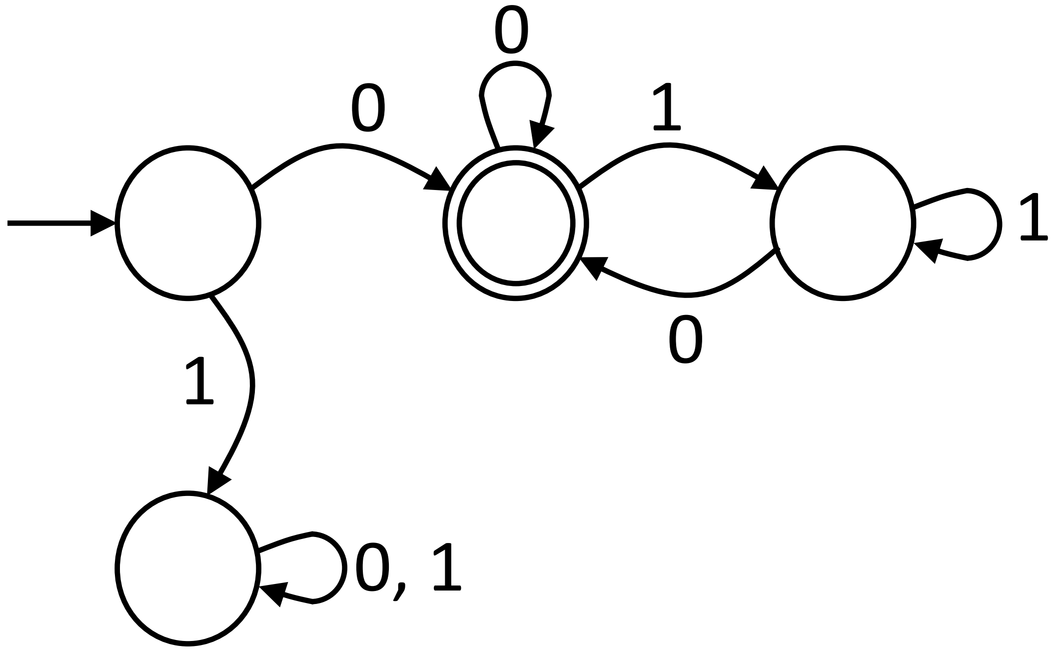

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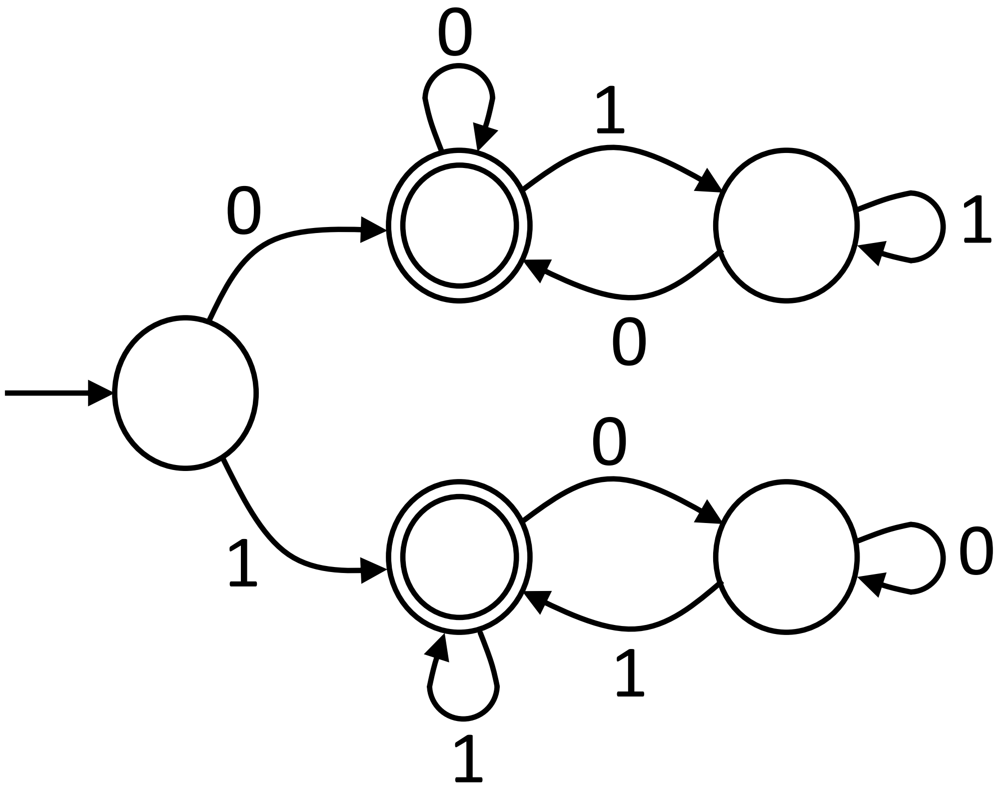

Prove that the following language is regular:

$\{\omega\colon \omega \neq \varepsilon$ and every odd symbol is a $1\}$.

Proof:

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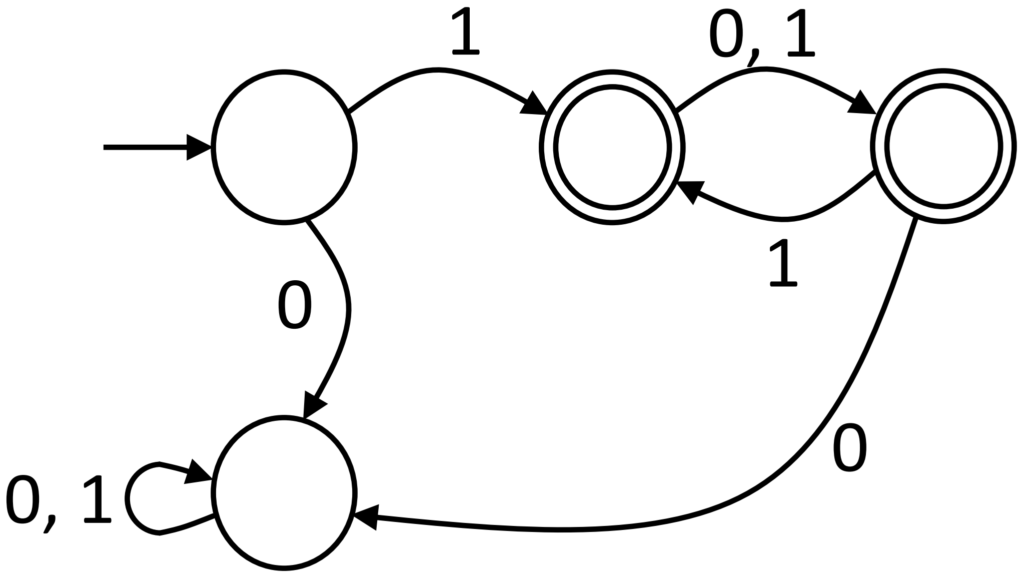

Prove that the following language is regular:

$$\{\omega: |\omega| \leq 3\}.$$

$|\omega| =$ length of ω. I.e. number of characters in ω.

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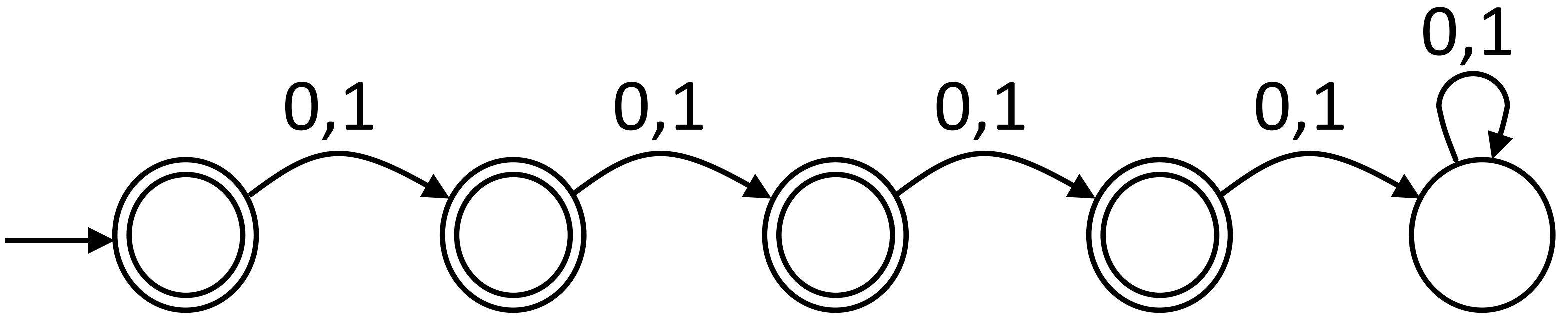

Prove that the following language is regular:

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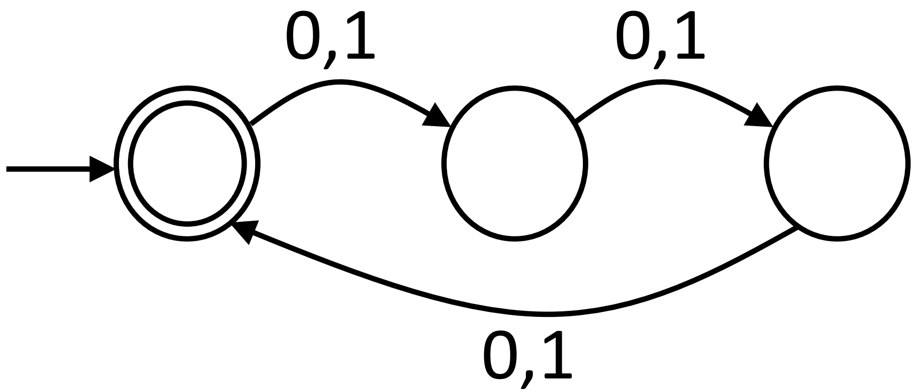

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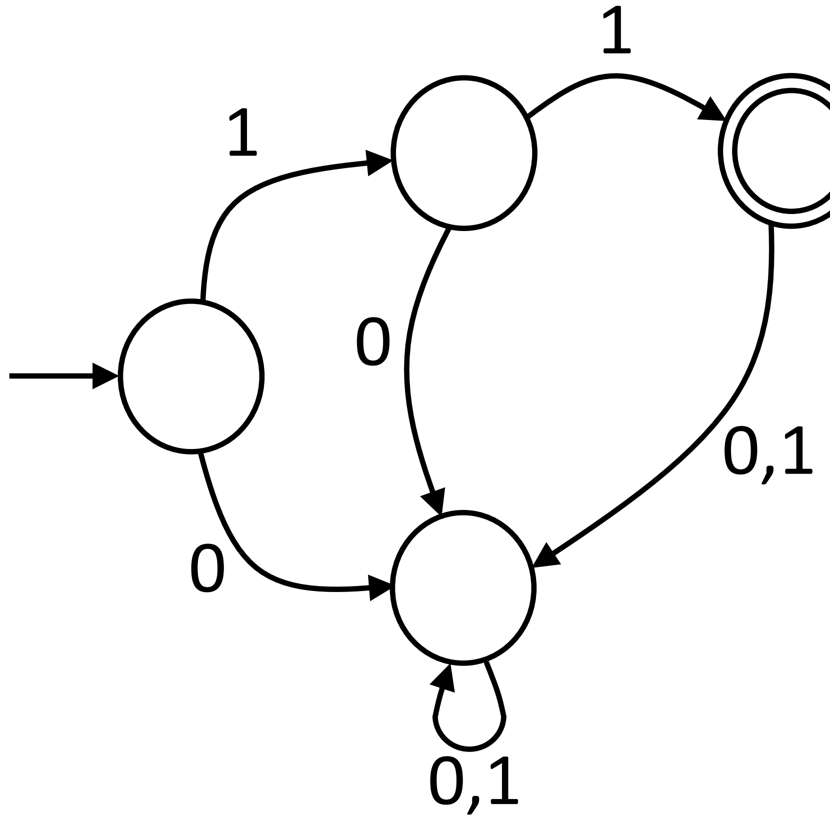
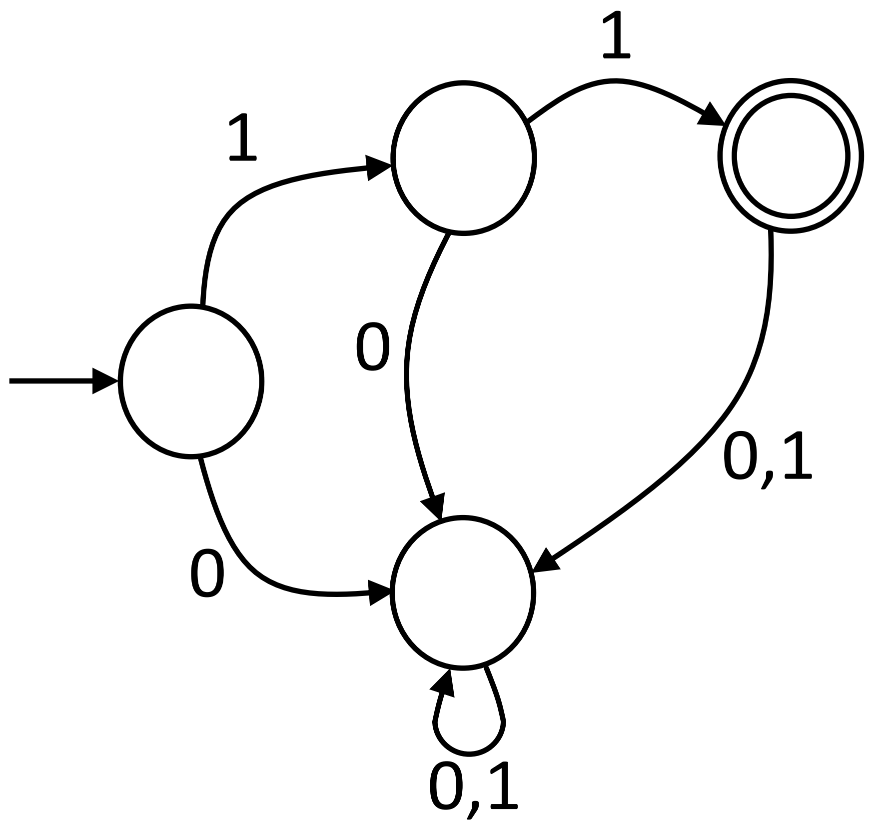


Prove that the following language is regular:

$\{\omega : \omega \text{ could be anything except } 11\}$.

Proof:



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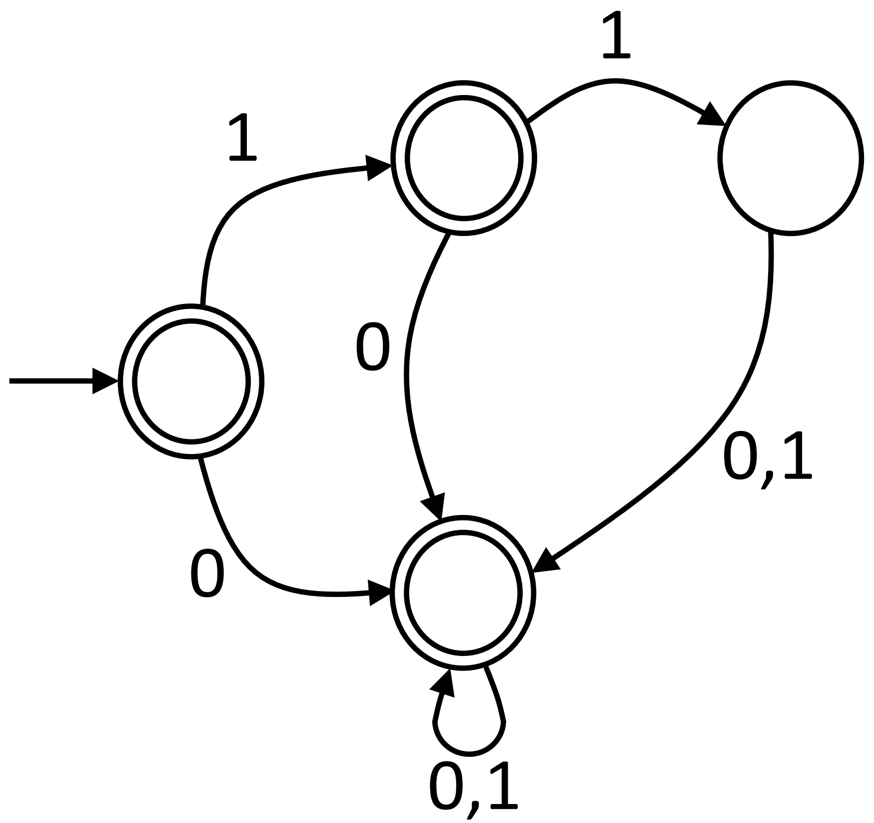

Complements of Regular Languages

Claim: If A is a regular language, then the following is also regular:

$$\bar{A} = \{\omega : \omega \notin A\}$$

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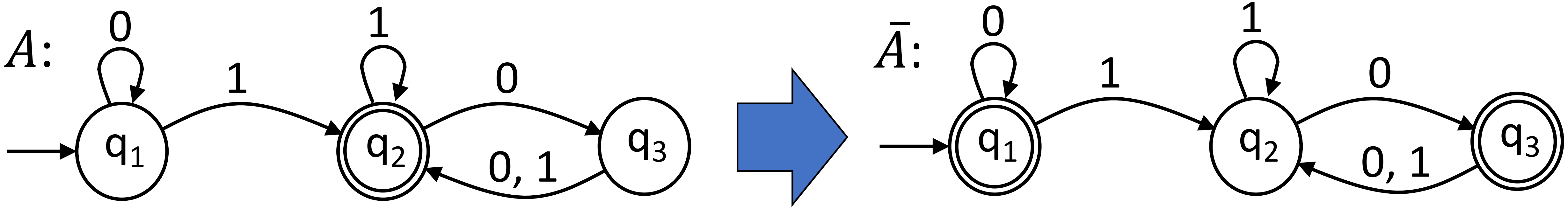

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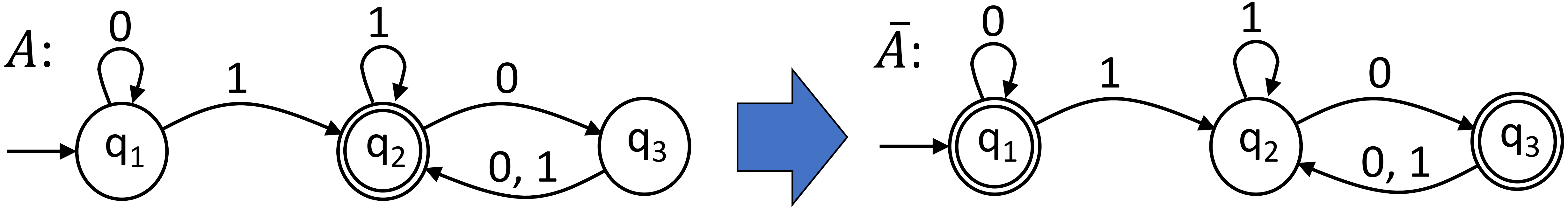
Given DFA_A for A, build a $\mathrm{DFA}_{\bar{A}}$ for $\bar{A}$:

Turn accept states into non-accept states and turn non-accept states into accept states.

If $\omega \in A$, then processing it ended on an accept state, which is a non-accept state for $\mathrm{DFA}_{\bar{A}}$, thus $\omega \notin \bar{A}$. (similar if $\omega \notin A$)



Prove that the following language is regular:

$\{\omega: \omega$ contains at least three 1s$\}$.

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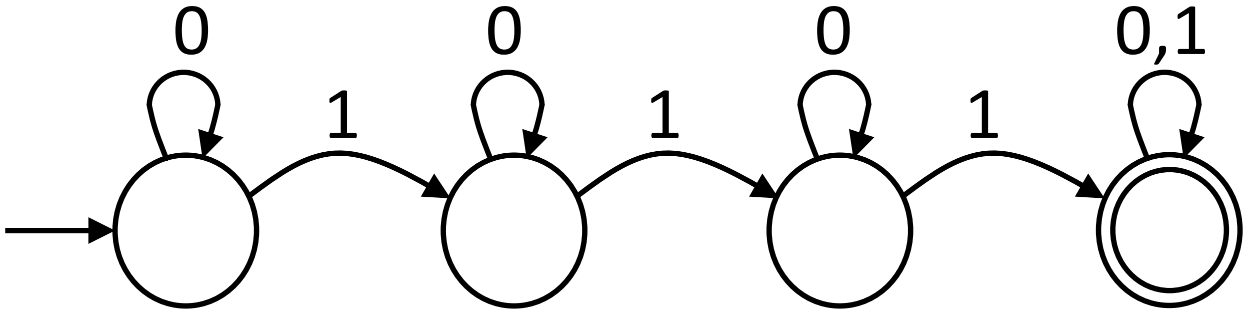

Prove that the following language is regular:

$\{\omega\colon \omega \text{ contains exactly three 1s}\}$.

Proof:

?

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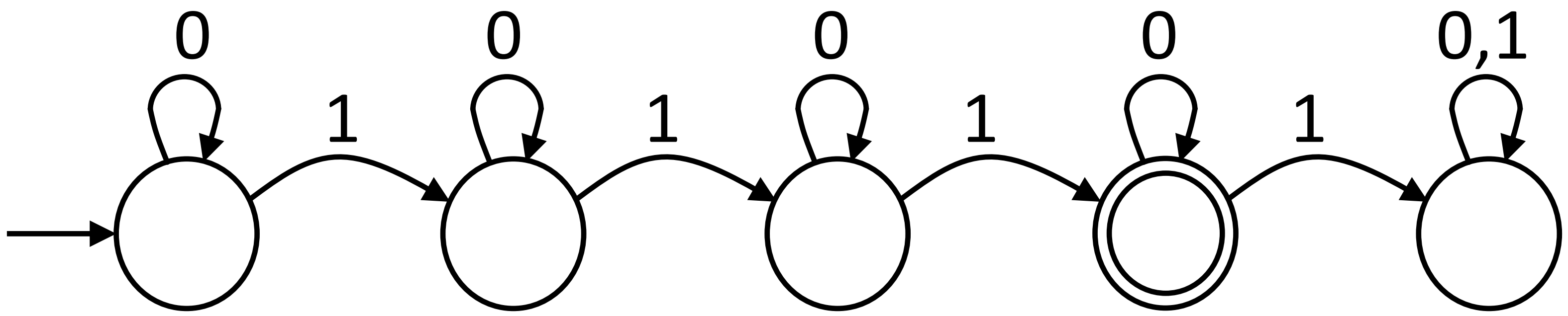
$\{\omega : \omega \text{ contains exactly three 1s}\}.$

Proof:



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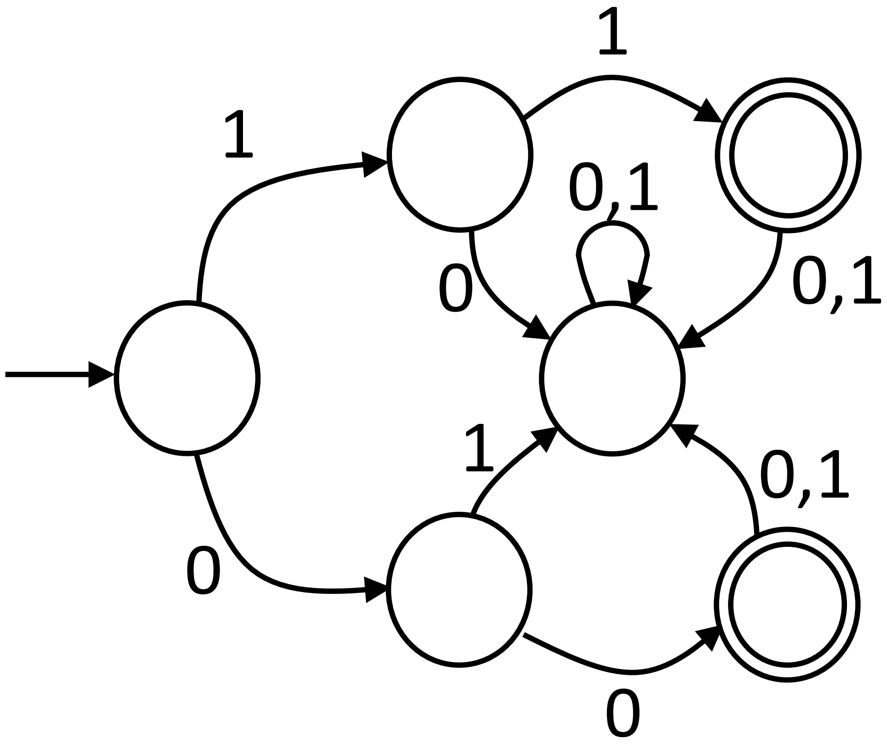

Only 11 and 00.

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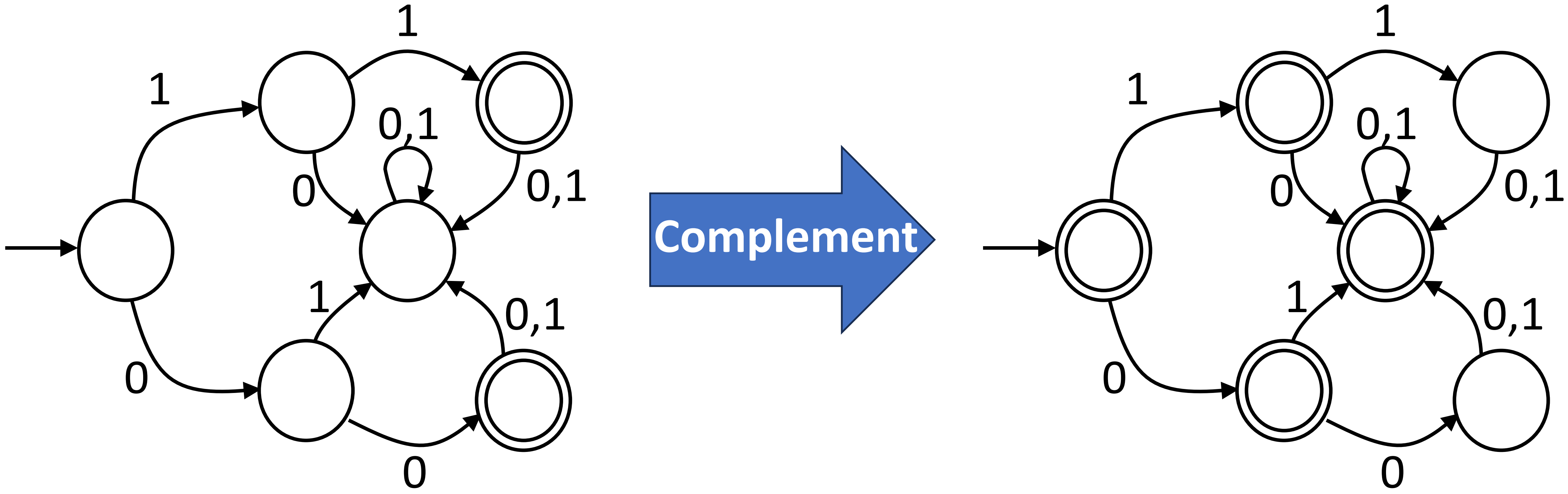

Only 11 and 00.

Everything but 11 and 00.

Prove that the following language is regular:

$\{\omega : \omega$ consists of the same number of 1's and 0's$\}$.

E.g. 110100, 000111

Proof:

?