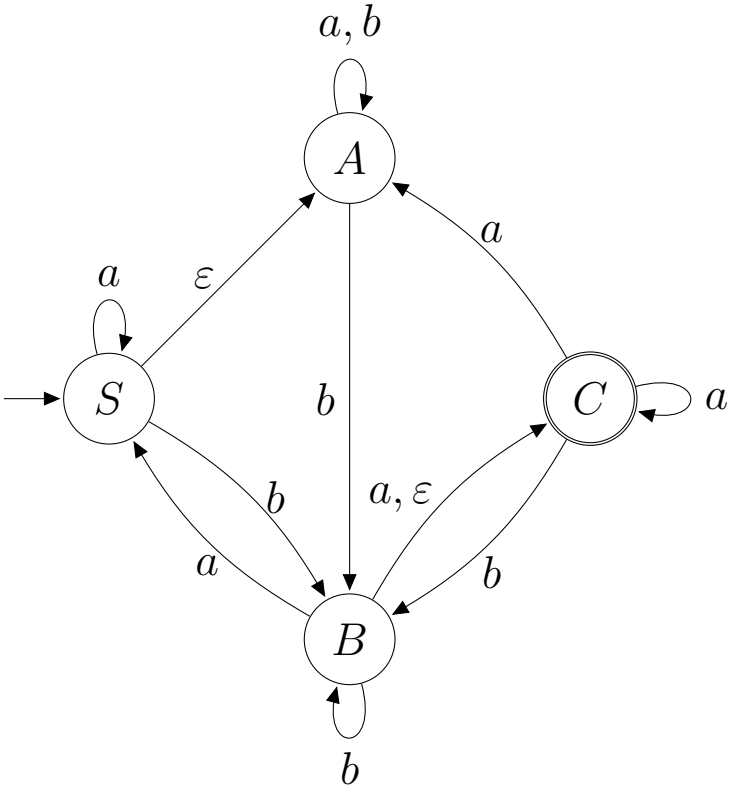
Languages and Automata (Gyula Katona) October 4., 2016, 18:15-19:15

Neptun code: **Name:**

Midterm 1

1. Construct a deterministic finite automaton which is equivalent to the following non-deterministic finite automaton using the algorithm we have learned in class. $\Sigma = \{a, b\}$



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2. (a) Define the star operation on languages. (If A is a language then what is the definition of the language A^*?)

(b) Prove that if A is a regular language then A^* is also regular. (We have proved this in class.)

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3. Let $\Sigma = \{a, b\}$ and let the language L contain all words over Σ for which at least one of the following conditions are satisfied:

   - the number of a characters and the number of b characters in the word are both odd
   - the first and last character of the word is the same
   - the word does **not** contain the subword *bbbb*

   Prove that L is a regular language.

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4. Prove that the language $L = \{(ab)^n c^{5n} \mid n \geq 1\}$ is not regular. Use the pumping lemma.