

Names: Omar Abdelmotaleb and Benjamin Singleton

Pledge: I pledge my honor that I have abided by the Stevens Honor System. -Omar Abdelmotaleb

Pledge: I pledge my honor that I have abided by the Stevens Honor System. -Benjamin Singleton

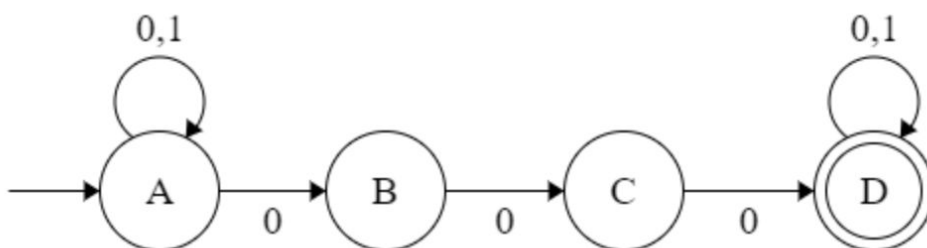
Problem 1. (15 points) For each regular expression below, construct an equivalent NFA.

a. $(0 \cup 1)^*000(0 \cup 1)^*$

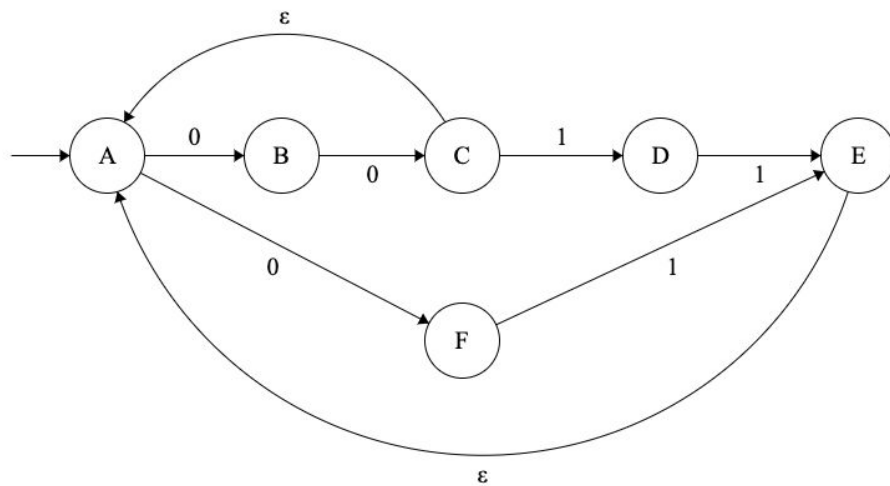
b. $((00)^*11 \cup 01)^*$

c. ϕ^*

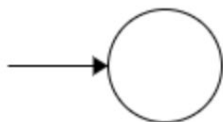
a.



b.



c.



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Problem 2. (15 points) Give regular expressions to generate each language below:

a. $\{w \in \{a, b\}^* : w \text{ does not end in } ba\}$

b. $\{w \in \{0, 1\}^* : w = \alpha \circ \beta, \alpha \text{ has an even number of 1's and } \beta \text{ has an even number of 0's}\}$

a. $(a \cup b)^*(aa \cup bb \cup ab)$

b. $(0^*(11)^*)^*(1^*(00)^*)^*$

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Problem 3. (10 points) In some programming languages, comments appear between delimiters such as `/#` and `#/`. Let C be the language of all valid delimited comment strings. Each member of C must begin with `/#` and end with `#/` but have no intervening `#/`. For simplicity, let the alphabet be $\{a, b, /, \#\}$. Give a regular expression to describe C .

$$(/# (a \cup b \cup / \cup (\#^*(a \cup b)))^* \# /)$$

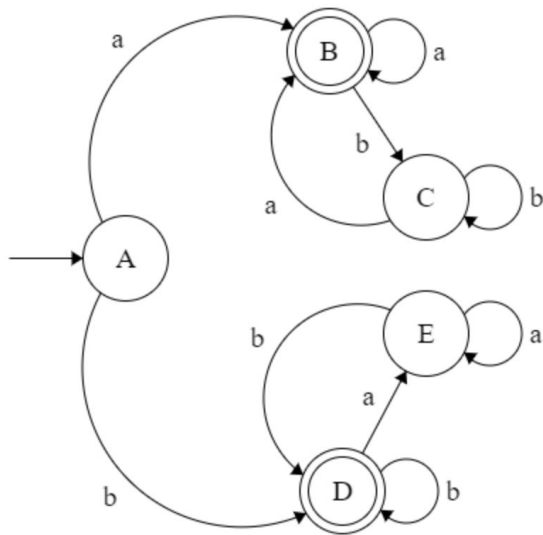
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Problem 4. (15 points) Prove that the following languages are regular (your answer can be any one of: DFA/NFA/regular expression). Unless stated otherwise, $\Sigma = \{a, b\}$.

- a. $\{w : w \text{ starts and ends with the same symbol}\}$
- b. Let $\Sigma = \{a, b, c, d\}$. The language L consists of all strings in which at least one symbol of Σ is missing.
- c. $\{w : w \text{ has even length and an odd number of } a\text{'s}\}$



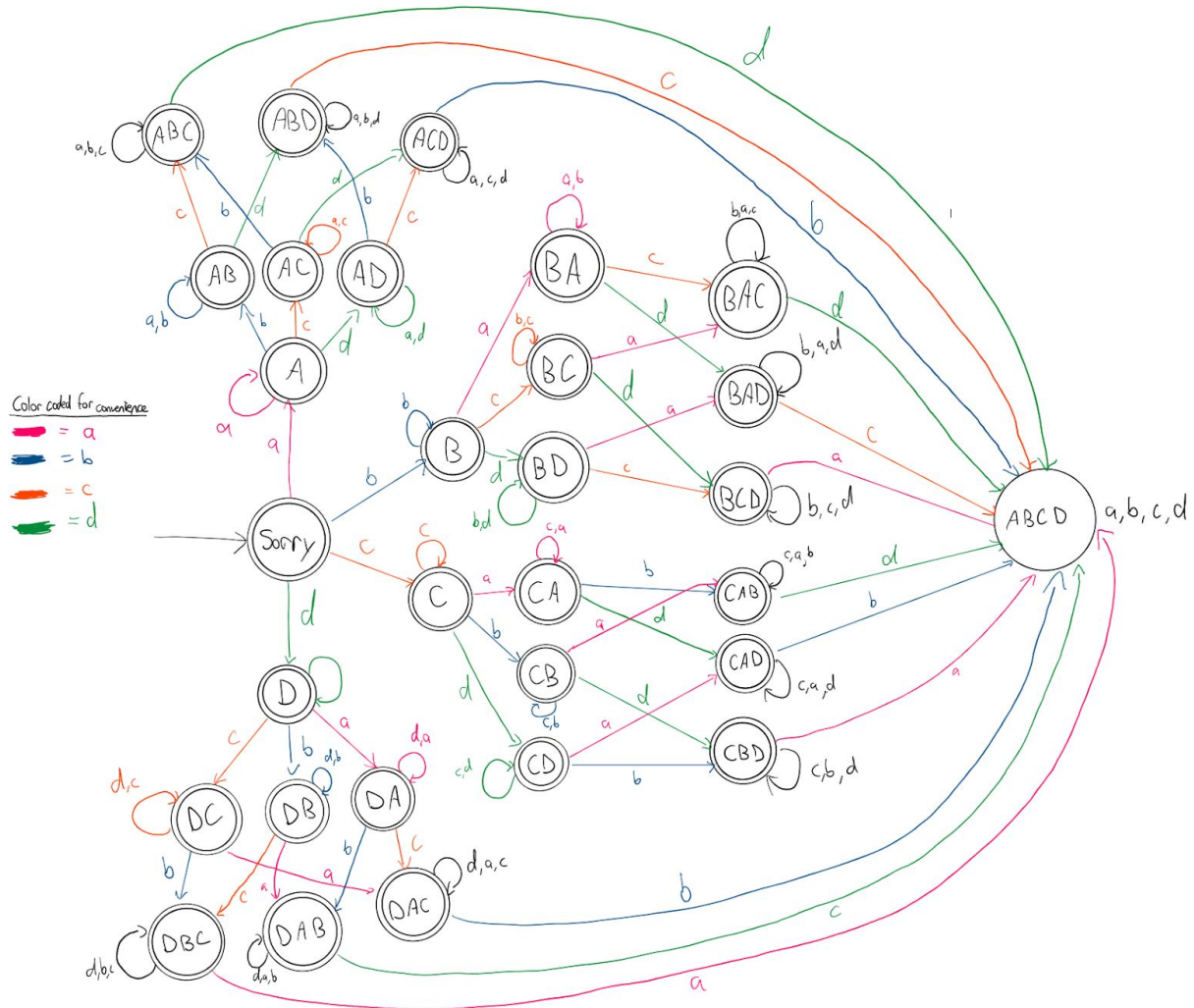
a.

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b.



c.

