Assignment I (20 pts)

Burak Ekici

Assigned : March the 4th, 00h00
Due : March the 13th, 23h55

Q1 (10 pts). Design deterministic finite automaton (DFA) that recognizes the language

$$\mathcal{L} := \{w \mid w \text{ begins and ends with the same letter} \wedge |w| > 1\}$$

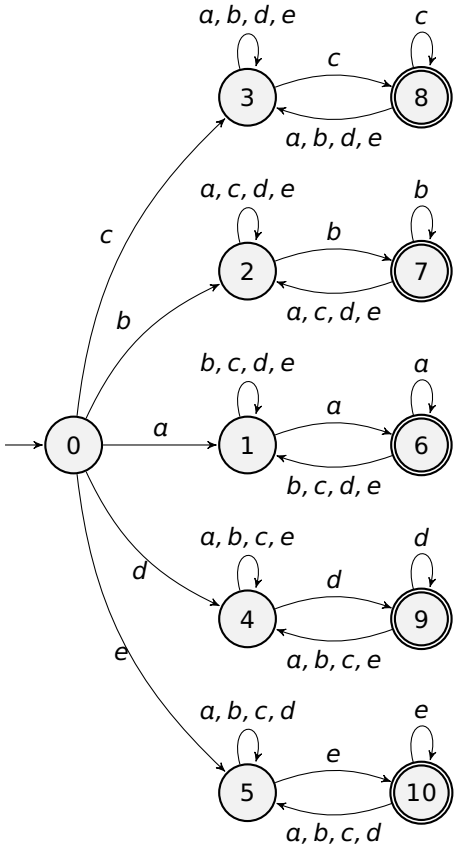
defined over the alphabet $\Sigma = \{a, b, c, d, e\}$.

A1.

Transition function δ of a DFA

$$M := \big(\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}, \{a, b, c, d, e\}, \delta, 0, \{6, 7, 8, 9, 10\}\big)$$

that recognizes the language $\mathcal{L}$ is depicted below.



Q2 (6 pts). Design deterministic finite automaton (DFA) that recognizes the language

$$\mathcal{L} := \{ w \mid w \text{ contains “}bbba\text{” as substring } \}$$

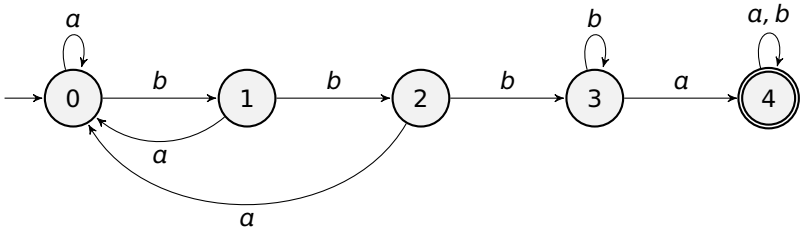
defined over the alphabet $\Sigma = \{a, b\}$.

A2.

Transition function δ of a DFA

$$M := \big(\{0, 1, 2, 3, 4\}, \{a, b\}, \delta, 0, \{4\}\big)$$

that recognizes the language $\mathcal{L}$ is depicted below.



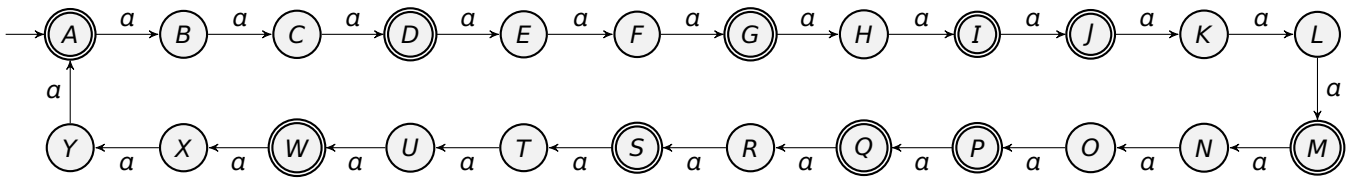
Q3 (4 pts). Design deterministic finite automaton (DFA) that recognizes the set of strings $\{a\}^*$ whose length is divisible by either 3 or 8.

A3.

Transition function δ of a DFA

$$M := \big(\{A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, W, X, Y\}, \{a\}, \delta, A, \{A, D, G, I, J, M, P, Q, S, W\}\big)$$

that recognizes the intended language is depicted below.



Important Notice:

- Collaboration is strictly and positively prohibited; lowers your score to 0 if detected.
- Any submission after 23h55 on March the 13th will NOT be accepted. Please beware and respect the deadline!
- All handwritten answers should somehow be scanned into a single PDF file, and only then submitted. Make sure that your handwriting is decent and readable.