0/9 Questions Answered

Week 3 Wednesday Review Quiz

Student Name

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Q1 Set-wise concatenation

4 Points

For alphabet Σ, given languages L_1 and L_2 over Σ, the set-wise concatenation is defined as $L_1 \circ L_2 = \{w \in \Sigma^* \mid w = uv \text{ for some strings } u \in L_1 \text{ and } v \in L_2\}$

Q1.1

1 Point

Consider the alphabet $\{a, b\}$. How many strings are in the set $\{\varepsilon, a, b\} \circ \{\varepsilon, a, b\}$?

- 0 (i.e.\ the set is empty)
- 3
- 6
- 9
- Some other (finite) number
- Infinitely many unique strings

Save Answer

Q1.2
2 Points

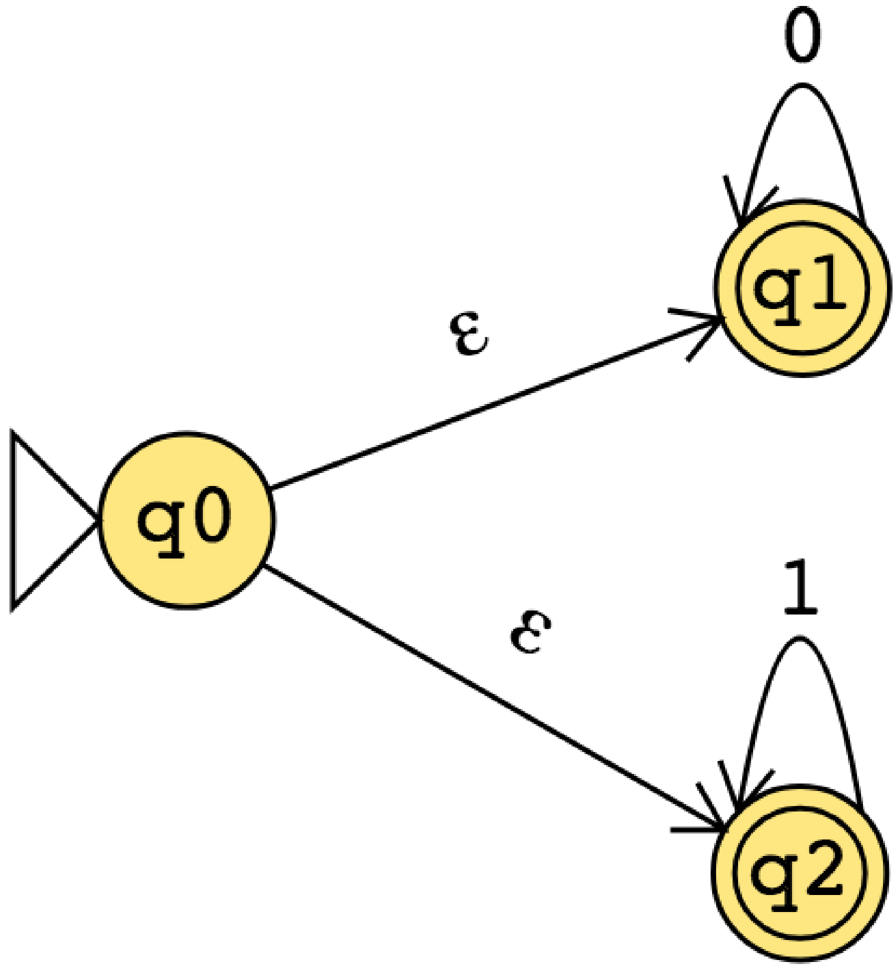
Let $N_1 = (Q_1, \Sigma, \delta_1, q_1, F_1)$ and $N_2 = (Q_2, \Sigma, \delta_2, q_2, F_2)$ be NFAs. When applying the construction in Theorem 1.47 to build the NFA $N = (Q, \Sigma, \delta, q_1, F_2)$ that recognizes $L(N_1) \circ L(N_2)$, select all and only the statements below that are universally true.

- ☐ $|Q| > |Q_1|$
- ☐ $|Q| > |Q_2|$
- ☐ $|Q| > 2$
- ☐ $|Q| = |Q_1| + |Q_2|$
- ☐ $|Q| = |Q_1| \cdot |Q_2|$

Save Answer

Q1.3
1 Point

The NFA whose state diagram below



is the result of applying the set-wise concatenation construction to obtain a machine that recognizes the language $\{w \in \{0,1\}^* | w \text{ has zeros followed by 1s}\}$

True

False, it is the result of applying the union construction instead to obtain the machine that recognizes the language $\{w \in \{0,1\}^* | w \text{ has all zeros or all 1s}\}$

False, it is the result of applying the intersection construction instead to obtain the machine that recognizes the language $\{w \in \{0,1\}^* | w \text{ has all zeros and all 1s}\}$

False, it is the result of applying the Kleene star construction instead to obtain the machine that recognizes the language $\{0,1\}^*$

Save Answer

Q2 Kleene star
2 Points

Q2.1
1 Point

Select all and only the languages below for which $L^* = L$.

- [ ] $\emptyset$
- [ ] $\{\varepsilon\}$
- [ ] $\{0\}$
- [ ] $\{0, 1\}$
- [ ] $\{0, 1\}^*$

Save Answer

Q2.2
1 Point

True or False: The construction from Theorem 1.49 for an NFA that recognizes L^* from an NFA that recognizes L always gives the smallest number of states required in an NFA that recognizes L^*.

True

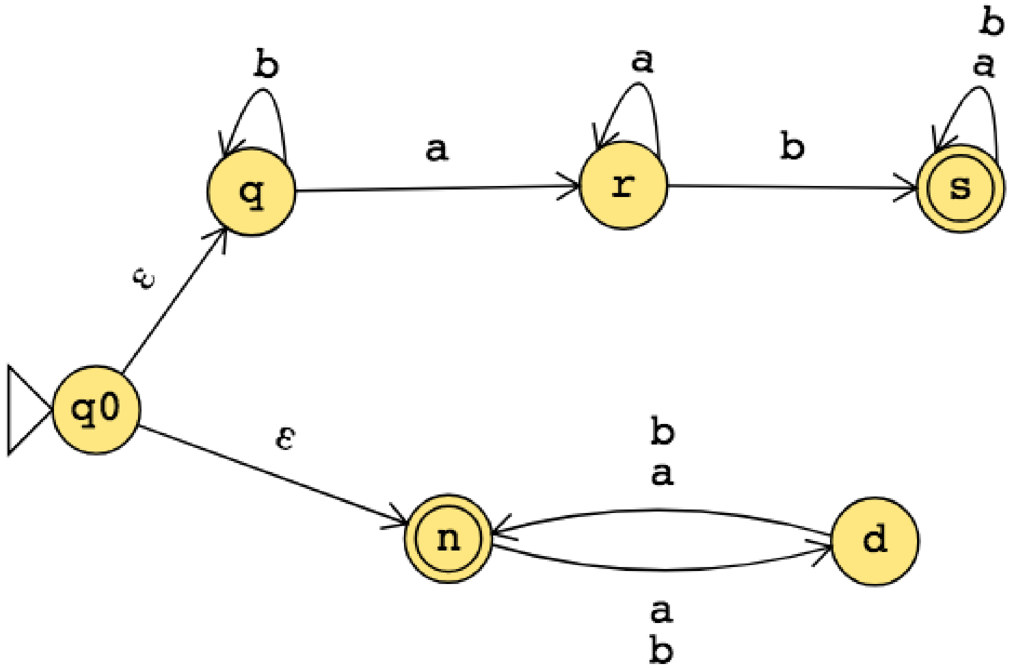
False

Save Answer

Q3 NFA to DFA

2 Points

Consider the following state diagram of a NFA over the alphabet $\{a, b\}$.



Answer the following questions about applying the construction for building an equivalent DFA from Theorem 1.39.

What is the start state of the equivalent DFA?

$q0$

$\{q0\}$

$\{q0, q, n\}$

What is the output of the transition function for the equivalent DFA from the start state on reading the character a?

$\emptyset$

$\{q0\}$

$\{q\}$

$\{n\}$

$\{q, n\}$

$\{q, d\}$

$\{r, n\}$

$\{r, d\}$

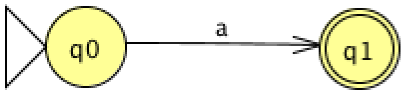
None of the above, because DFA have a single state as the output of each transition function application, not a set of states.

Save Answer

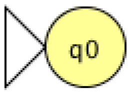
Q4 Regular expression to NFA

1 Point

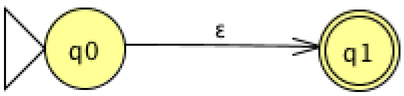
First diagram:



Second diagram:



Third diagram:



Which of the three diagrams above is a state diagram over the alphabet $\{a, b\}$ for a NFA that recognizes the language $L = \emptyset$?

first diagram

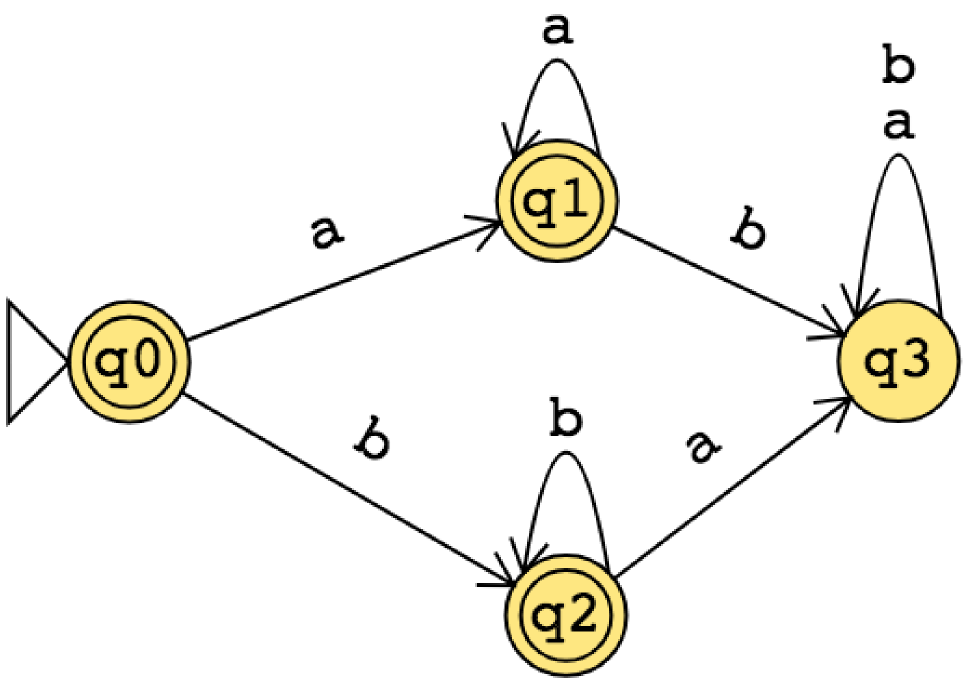
second diagram

third diagram

None of the above

Save Answer

Q5 DFA to regular expression
1 Point



Which of the following regular expressions describe the language recognized by the DFA with state diagram above? (Select all and only that apply.)

- [ ] $a^+ \cup b^+$
- [ ] $\varepsilon \cup aa^* \cup bb^*$
- [ ] $a^*a \cup b^*b \cup \varepsilon$
- [ ] $aa^*b(a \cup b)^* \cup bb^*a(a \cup b)^*$
- [ ] $a^+b(a \cup b)^* \cup b^+a(a \cup b)^*$

Save Answer

Q6 Feedback

0 Points

Any feedback about this week's material or comments you'd like to share? (Optional; not for credit)

Save Answer

Save All Answers

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