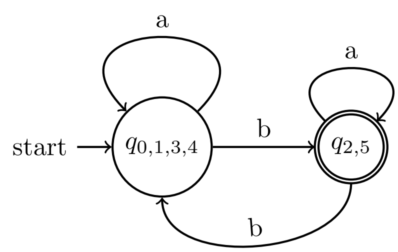
Student Information

Name: Batuhan Akçan
ID: 2580181

Answer 1

1

$\equiv_0$: $\{q_0, q_1, q_3, q_4\}, \{q_2, q_5\}$
$\equiv_1$: $\{q_0, q_1, q_3, q_4\}, \{q_2, q_5\}$
Since $\equiv_0$ is equal to $\equiv_1$, the algorithm terminates. The equivalent minimal DFA is:



2

$[q_{0,1,3,4}] = a^* \cup (a^*ba^*b)^*$
$[q_{2,5}] = a^*ba^*(ba^*ba^*)^*$

3

Consider a^i and a^j where $i \neq j$. Let $i = k + 2u - m$. Then $a^i \not\approx_{L'} a^j$ because $a^i b^m c^k d^u \in L$ and $a^j b^m c^k d^u \notin L$. There are infinitely many i, j pairs because $m, k, u \in \mathbb{N}$, which means there are infinitely many m, k, u. Thus, there are infinitely many equivalence classes. Hence, by MyHill-Nerode Theorem, L' is not regular.

Answer 2

1

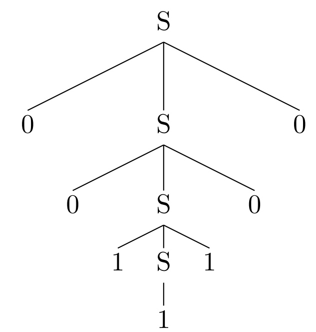
$G = (V, \Sigma, R, S)$ where
$V = \{S, a, b\}$
$\Sigma = \{a, b\}$
$R = \{S \rightarrow b,\ S \rightarrow bS,\ S \rightarrow Sb,\ S \rightarrow bSa,\ S \rightarrow aSb\}$

2

$G = (V, \Sigma, R, S)$ where
$V = \{S, 0, 1, 2\}$
$\Sigma = \{0, 1, 2\}$
$R = \{S \to e,\ S \to 0S1,\ S \to 1S0,\ S \to 1S2,\ S \to 2S1\}$

3

$G = (V, \Sigma, R, S)$ where
$V = \{S, 0, 1\}$
$\Sigma = \{0, 1\}$
$R = \{S \to 0,\ S \to 1,\ S \to 1S0,\ S \to 0S1,\ S \to 0S0,\ S \to 1S1\}$



Answer 3

1

$L_1 = \{w \in \{0,1\}^* \mid w = 0(0 \cup 1)^*0\ \cup\ 1(0 \cup 1)^*1\ \cup\ e\}$

2

$L_2 = \{w \in \{0,1\}^* \mid w = (0 \cup 1)^*1(0 \cup 1)^*1(0 \cup 1)^*\}$