Student Information

Full Name : Furkan KARACA
Id Number : 2521698

Answer 1

1) False. We can't represent all real numbers since there are some numbers like 1.11111111.. which makes a string infinite.
2) False. Strings of a language are finite but count of strings could be infinite, which is not finitely representable.
3) It is possible if we choose first a^* and last b^* as empty string and first b^* as bb and second a^* as a.
4) a^+b^+ could be ab, aab, abb.. and so on. No matter what $(aUb)^*$ takes, there are some combinations that make the answer false.

Answer 2

a)
K: $\{q_0, q_1, q_2, q_3, q_4\}$
$\sum$: $\{a, b\}$
s: $\{q_0\}$
F: $\{q_0, q_1, q_2, q_3\}$
δ: $\{((q_0, a), q_2), ((q_0, b), q_1), ((q_1, a), q_2), ((q_1, b), q_1), ((q_2, a), q_2), ((q_2, b), q_3),$
$((q_3, a), q_4), ((q_3, b), q_1), ((q_4, a), q_4), ((q_4, b), q_4)\}$
b)

$(q_0, abbaabab) \vdash_M (q_2, bbaabab) \vdash_M (q_3, baabab) \vdash_M (q_1, aabab) \vdash_M (q_2, abab) \vdash_M (q_2, bab) \vdash_M (q_3, ab) \vdash_M (q_4, b) \vdash_M (q_4, e)$ DFA rejects the input since q_4 is not a final state.

Answer 3

1) $E(q_0) = \{q_0, q_2\}$
$E(q_1) = \{q_1\}$
$E(q_2) = \{q_2\}$
$E(q_3) = \{q_0, q_2, q_3\}$
$E(q_4) = \{q_0, q_2, q_3, q_4\}$

2)
1: True. We must define all subsets of K.

2: True. We must define the alphabet in order to give inputs and it is same as Σ since alphabet is same.
3: True. Since it is mentioned that starting state doesn't have any empty transition, we can just take it as starting state.
4: False. There could be different finish states in F' because of empty transitions and different input style of DFA. To correct it, we should find elements of K' that contain final states.
5: False. We must take care of empty transitions as well. the function returns a union set of E(p).