Quiz 7

1. Let R be a regular expression with n operators. Let N_R be the NFA constructed by the inductive algorithm described in lecture 7, such that $\mathbf{L}(R) = \mathbf{L}(N_R)$, and let m be the number of states in N_R. Pick the best upper bound for m from the choices below.

   (A) $O(\log n)$

   (B) $O(n)$

   (C) $O(n^2)$

   (D) $O(2^n)$

   Correct answer is (B).

2. Let R_1 and R_2 be two regular expressions with $\mathbf{L}(R_1) = \mathbf{L}(R_2)$. Let N_1 and N_2 be the NFA constructed by the inductive algorithm described in lecture 7, for R_1 and R_2, respectively. Which of the following statements is necessarily true about R_1, R_2, N_1, and N_2?

   (A) R_1 and R_2 must be syntactically the same regular expression.

   (B) N_1 and N_2 have the same number of states.

   (C) N_1 and N_2 have the same number of transitions.

   (D) If R_1 and R_2 are syntactically the same then N_1 and N_2 will have the same number of states and transitions.

   Correct answer is (D).

3. Which of the following facts is *not* true about GNFAs?

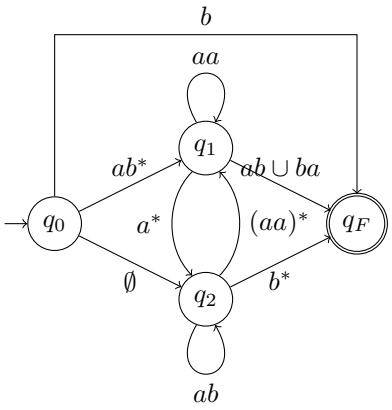
   (A) A GNFA has exactly one final state.

   (B) The initial state of a GNFA could also be a final state.

   (C) The initial state of a GNFA has no incoming transitions.

   (D) The final state of a GNFA has no outgoing transitions.

   Correct answer is (B).



4. Which of the following strings is accepted by the GNFA in the figure above?

   (A) ϵ

   (B) $ababbaa$

   (C) $aaab$

   (D) $ababbaaa$

   Correct answer is (C).

5. Let G be a GNFA with two states: the initial state q_0 and the accept state q_F. The only transtion in G (from q_0 to q_F) is labelled by the regular expression R. The regular expression that describes the language recognized by G is

   (A) R

   (B) R^*

   (C) $R \cup \{\epsilon\}$

   (D) Cannot be determined based on the information given.

   Correct answer is (A).