CSC236 Tutorial Exercises, July 26

Let the alphabet be $\Sigma = \{a, b\}$

1. Are regular expressions $(a + b)^*$ and $a^* + b^*$ equivalent? Explain.

2. Draw a DFA corresponding to the regular expression $(a + b)(a + b)^*(a^* + b^*)$. Write down the corresponding state invariant that you could use to prove the equality of your DFA to the regular language represented by the provided regexp. You don't need to provide the proof.

3. Consider a regexp R_1: $a(ba^*)(a^* + b^*)$

    (a) Draw an NFA M_2 corresponding to the R_1 above

    (b) Write down the language $\mathcal{L}$ that it represents (a sentence describing all strings)

    (c) Draw a corresponding DFA

4. Consider the NFA A with transition relation $\delta = \{(q_0, a, q_1), (q_1, b, q_0), (q_1, b, q_2), (q_2, a, q_0)\}$, with initial state q_0 and final states $F = \{q_0\}$. Use the subset construction to find an equivalent DFA.