CS 4124
Solutions to Homework Assignment 5

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[50] 1. Let $\mathcal{R}_1$ be the (simplified) regular expression $(ba)^\star + (abb)(abb)^\star$.

Construct an ε-NFA N_1 that accepts the language denoted by $\mathcal{R}_1$. You should employ the construction given in class or in the textbook for inspiration, but you do not have to follow the construction precisely. Use reason to construct your N_1 and justify your reasoning. Give N_1 as a labeled directed graph or state diagram. Please draw it neatly!

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[50] 2. Let N_2 be the ε-NFA in Figure **??**.

A. Compute the ε-reachability set $E(q)$ of each state q of N_2.

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

B.

bb	$q_0 \xrightarrow{b} q_1 \xrightarrow{b} q_2$
cb	$q_0 \xrightarrow{\varepsilon} q_1 \xrightarrow{c} q_1 \xrightarrow{b} q_2$
ε	$q_0 \xrightarrow{\varepsilon} q_2$
c	$q_0 \xrightarrow{c} q_2$
b	$q_0 \xrightarrow{\varepsilon} q_1 \xrightarrow{b} q_2$
ab	$q_0 \xrightarrow{\varepsilon} q_1 \xrightarrow{a} q_0 \xrightarrow{\epsilon} q_1 \xrightarrow{b} q_2$
cc	$q_0 \xrightarrow{\epsilon} q_1 \xrightarrow{c} q_0 \xrightarrow{c} q_2$
ac	$q_0 \xrightarrow{\epsilon} q_1 \xrightarrow{a} q_0 \xrightarrow{c} q_2$
ca	$q_0 \xrightarrow{\epsilon} q_1 \xrightarrow{c} q_1 \xrightarrow{a} q_0 \xrightarrow{\epsilon} q_2$
ba	$q_0 \xrightarrow{b} q_1 \xrightarrow{a} q_0 \xrightarrow{\epsilon} q_2$
a	$q_0 \xrightarrow{\epsilon} q_1 \xrightarrow{a} q_0 \xrightarrow{\epsilon} q_2$

C. Use the power set construction to obtain a DFA M_2 equivalent to N_2. Give M_2 as a labeled directed graph or state diagram. Please draw it neatly!
