School for Computer Science and Information Technology

Machines and their languages (G51MAL) Spring 2004

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Solutions to 2nd Coursework

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1. $E = (\{q_0, q_1, q_2, q_3\}, \{\mathrm{a}, \mathrm{b}, \mathrm{c}\}, \delta_E, \{q_0\}, \{q_2, q_3\})$. with

δ_E	a	b	c
$\rightarrow q_0$	$\{q_0, q_1\}$	$\{q_0, q_3\}$	$\{q_0\}$
q_1	$\{q_2\}$	$\{q_2\}$	$\{q_2\}$
$*q_2$	$\{\}$	$\{\}$	$\{\}$
$*q_3$	$\{\}$	$\{\}$	$\{\}$

2. $\mathrm{acab}, \mathrm{bcaa}, \mathrm{bab}, \in L(E)$, $\epsilon, \mathrm{acc} \notin L(E)$.

3.
$$\begin{aligned}
\hat{\delta}_C(\{q_0, q_1\}, \mathrm{ab}) &= \hat{\delta}_C(\delta_C(q_0, a) \cup \delta_C(q_1, a), b) \\
&= \hat{\delta}_C(\{q_0, q_1, q_2\}, b) \\
&= \hat{\delta}_C(\delta_C(q_0, b) \cup \delta_C(q_1, b) \cup \delta_C(q_2, b), \epsilon) \\
&= \hat{\delta}_C(\{q_0, q_2, q_3\}, \epsilon) \\
&= \{q_0, q_2, q_3\}
\end{aligned}$$

4. $L(E)$: either the last symbol is b or the one before the last is a. Or more formally

$$L(E) = \{w\mathrm{b} \mid w \in \Sigma_E^*\} \cup \{w\mathrm{a}x \mid w \in \Sigma_E^*, x \in \Sigma_E\}$$

5.