CS3133
HW#2 SOLUTIONS

1. The idea is to "guess", when reading a character, whether it will be the same as the final character. Then, when seeking a final character (say a), guess whether an a being read is the final character.

	a	b	c
$\rightarrow q_0$	$\{q_0, q_a\}$	$\{q_0, q_b\}$	$\{q_0, q_c\}$
q_a	$\{q_a, q_{af}\}$	$\{q_a\}$	$\{q_a\}$
$*q_{af}$	$\varnothing$	$\varnothing$	$\varnothing$
q_b	$\{q_b\}$	$\{q_b, q_{bf}\}$	$\{q_b\}$
$*q_{bf}$	$\varnothing$	$\varnothing$	$\varnothing$
q_c	$\{q_c\}$	$\{q_c\}$	$\{q_c, q_{cf}\}$
$*q_{cf}$	$\varnothing$	$\varnothing$	$\varnothing$

2. **a)** $\text{ECLOSE}(p) = \{p, q, r\}$ $\text{ECLOSE}(q) = \{q\}$ $\text{ECLOSE}(r) = \{r\}$

b) $\{w \mid w \in \{a,b,c\}^* \wedge |w| \le 2\} = \{e, a, b, c, aa, ab, ac, ba, bb, bc, ca, cb, cc\}$

c) *bbb* is not accepted by the automaton.

d)

	a	b	c
$\rightarrow *\{p, q, r\}$	$\{p, q, r\}$	$\{q, r\}$	$\{p, q, r\}$
$*\{q, r\}$	$\{p, q, r\}$	$\{r\}$`	$\{p, q, r\}$
$*\{r\}$	$\varnothing$	$\varnothing$	$\varnothing$
$\{q\}$	$\{p, q, r\}$	$\{r\}$	$\{p, q, r\}$
$\varnothing$	$\varnothing$	$\varnothing$	$\varnothing$

3. "Guess", with an e-transition, whether the input string contains an 010 or a 1011.

$A = (\{q_0, p_e, p_0, p_{01}, p_{010}, r_e, r_1, r_{10}, r_{101}, r_{1011}\}, \{0,1\}, d, q_0, \{p_{010}, r_{1011}\})$ where

	e	0	1
$\rightarrow q_0$	$\{p_e, r_e\}$	$\varnothing$	$\varnothing$
p_e	$\varnothing$	$\{p_e, p_0\}$	$\{p_e\}$
p_0	$\varnothing$	$\varnothing$	$\{p_{01}\}$
p_{01}	$\varnothing$	$\{p_{010}\}$	$\varnothing$
$*p_{010}$	$\varnothing$	$\{p_{010}\}$	$\{p_{010}\}$
r_e	$\varnothing$	$\{r_e, r_1\}$	$\{r_e\}$
r_1	$\varnothing$	$\{r_{10}\}$	$\varnothing$
r_{10}	$\varnothing$	$\varnothing$	$\{r_{101}\}$
r_{101}	$\varnothing$	$\varnothing$	$\{r_{1011}\}$
$*r_{1011}$	$\varnothing$	$\{r_{1011}\}$	$\{r_{1011}\}$