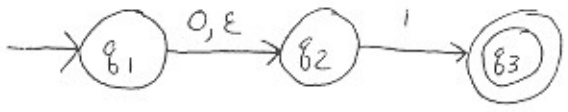
CSI 350 — Theory of Computation, Fall 2005

Quiz #2 - Monday, September 12, 2005

Given the following NFA, answer questions 1-4.

N



$Q = \{q_1, q_2, q_3\}$

$\Sigma = \{0, 1\}$

$q_0 = q_1$

$F = \{q_3\}$

1. Give the formal definition of the NFA.

$N = (Q, \Sigma, \delta, q_0, F)$

δ	0	1	ε
q_1	$\{q_2\}$	$\emptyset$	$\{q_2\}$
q_2	$\emptyset$	$\{q_3\}$	$\emptyset$
q_3	$\emptyset$	$\emptyset$	$\emptyset$

2. What language does the NFA recognize?

$L(N) = \{w \mid w \text{ is } 1 \text{ or } 01\}$

3. Give the regular expression which describes the language of the NFA.

$1 \cup 01$ or $(0 \cup \varepsilon)1$

4. Convert the NFA into a DFA.

DFA $M = (Q', \Sigma, \delta', q_0', F')$

$Q' = \{\{q_1\}, \{q_2\}, \{q_3\}, \{q_1, q_2\}, \{q_1, q_3\}, \{q_2, q_3\}, \{q_1, q_2, q_3\}, \emptyset\}$

$\Sigma = \{0, 1\}$ $q_0' = \{q_1, q_2\}$ $F = \{\{q_3\}, \{q_1, q_3\}, \{q_2, q_3\}, \{q_1, q_2, q_3\}\}$

δ'	0	1
$\emptyset$	$\emptyset$	$\emptyset$
$\{q_1\}$	$\{q_2\}$	$\emptyset$
$\{q_2\}$	$\emptyset$	$\{q_3\}$
$\{q_3\}$	$\emptyset$	$\emptyset$
$\{q_1, q_2\}$	$\{q_2\}$	$\{q_3\}$
$\{q_1, q_3\}$	$\{q_2\}$	$\emptyset$
$\{q_2, q_3\}$	$\emptyset$	$\{q_3\}$
$\{q_1, q_2, q_3\}$	$\{q_2\}$	$\{q_3\}$