

# HW6: Still Alive

*Due: Oct 27, 2010*

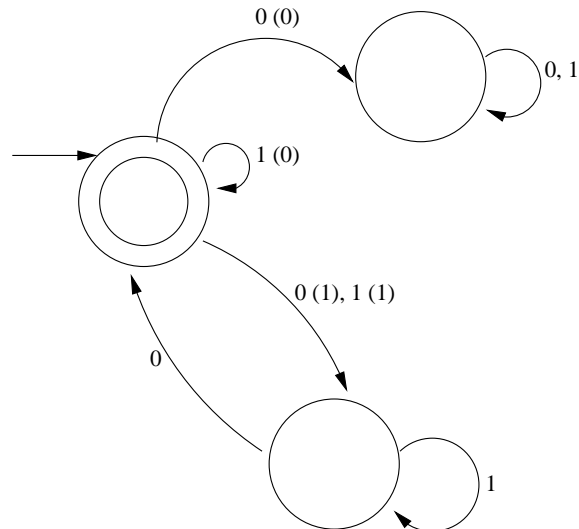
Include your *full name*, *CS login*, and the problem number(s) on each piece of paper you hand in, and please staple your pages together before handing in.

While collaboration is encouraged in this class, please remember not to take away notes from collaboration sessions other than your scheduled lab section.

In general, if you submit a complicated, messy FSM and include no explanation of how it works, it will probably not be graded.

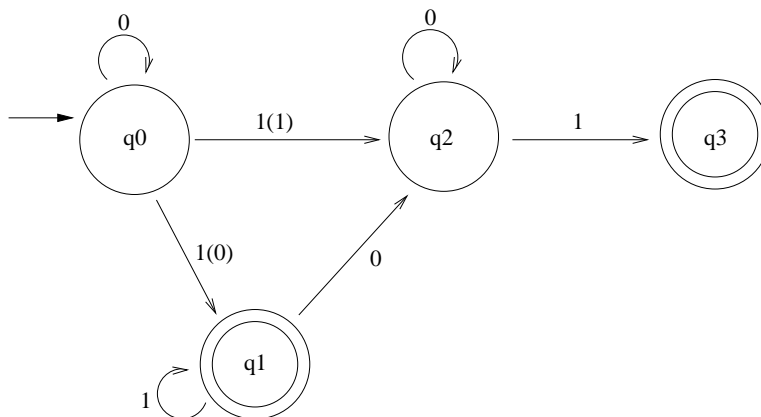
## Problem 1

Convert the following NFSM to a DFSM:



**Problem 2**

Write down the regular expression for the language that the following NFSM recognizes:

**Problem 3**

Let  $\Sigma = \{0, 1, 2\}$ , and let  $L$  be the language over  $\Sigma$  that contains each string  $w$  ending with some symbol that does not occur anywhere else in  $w$ . For example, 011012, 11120, 0002, 10, and 1 are all strings in  $L$ .

- Construct a nondeterministic finite-state machine that accepts  $L$ .
- Give a regular expression describing the language  $L$ .

**Problem 4**

Describe an algorithm that constructs an NFSM  $N$  with input alphabet  $\Sigma$  from a regular expression  $r$  over  $\Sigma$  such that  $N$  recognizes a string  $w$  if any substring of  $w$  is in the language defined by  $r$ . In other words,  $N$  recognizes the language

$$L = \{w = xyz \mid y \text{ is in the language defined by } r \text{ and } x \in \Sigma^* \text{ and } z \in \Sigma^*\}.$$