ETH
Eidgenössische Technische Hochschule Zürich
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Distributed Computing

HS 2010   Prof. R. Wattenhofer / J. Smula, T. Langner
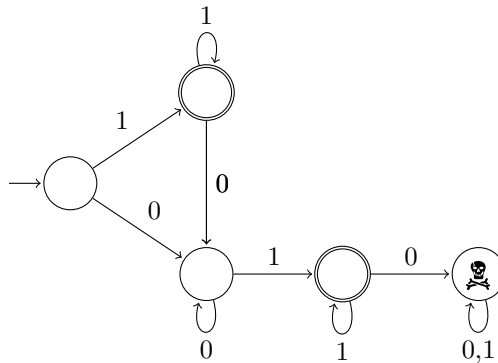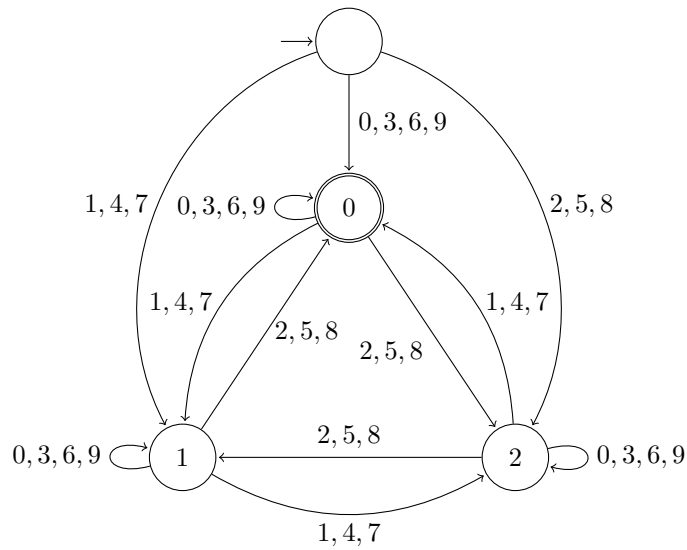
Discrete Event Systems
Solution to Exercise Sheet 1

1 Finite Automata

a) The following machine accepts all strings of the form 1*0*1*1.

b) We use the fact that a number is divisible by three if and only if its cross sum (in German: *Quersumme*) is divisible by three. Our machine has three states which denote the value of the cross sum computed so far modulo 3.

2 Vending Machine Revisited

If \$0.30 or \$0.40 have been inserted (states "30" and "40"), it is not possible anymore to reach state "45" by inserting dimes or quarters; thus, once in these "bad" states, no soda will ever be dispensed again.

One can think of several ways to circumvent this problem. For example, an additional button could be introduced at the machine which allows the user to return to state "0", ejecting the coins accumulated so far. Another solution would be to allow 5 cent coins.

3 "Mais im Bundeshuus"

a) The automaton accepts if and only if at least four members of the Swiss Federal Council vote in favor of the proposition. The following machine remembers the number of approving votes.
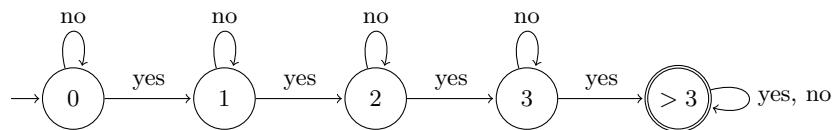
b) We consider the alphabet {yes, no, ?}, where "?" denotes abstention of voting.