1 Nondeterministic Finite Automata

a) The following automaton is an example.

b) The following automaton is an example.

c) A deterministic machine whose states are all accepting accepts every string of the corresponding alphabet. However, this does not hold for a nondeterministic automaton, namely if it is under-determined.
2 De-randomization

a) The automaton accepts the strings $0^*1^*2^*$. Without $\varepsilon$-transitions we have

![Diagram of an automaton](image)

b) The nondeterministic automaton can be found by applying the power set construction presented in the lecture followed by the state minimization algorithm. However, it is obvious that the automaton shown below does the job.

![Diagram of a nondeterministic automaton](image)

3 States Minimization

State $q_0$ can be omitted as it is not reachable. Moreover, states $q_1$ and $q_5$ can be merged, as there is no input sequence which will show a difference between these two states.

![Diagram of state minimization](image)

4 “Regular” Operations in UNIX

In UNIX, the special symbol “$” stands for the end of a line. We have:

```
egrep '(password|password)(a|e|i|o|u|A|E|I|O|U)*$'
```