Exercise 1: Rectangular automaton
Consider the following initialized rectangular automaton $H$:

$$
\begin{align*}
\ell_0, \quad \dot{x} \in [1, 2] \\
\dot{y} \in [3, 4]
\end{align*}
$$

(a) Construct an initialized singular automaton $H_1$ which is equivalent to $H$.
(b) Construct an initialized stopwatch automaton $H_2$ which is equivalent to $H_1$.
(c) Construct a timed automaton $H_3$ which is equivalent to $H_2$.

Use the constructions according to the lecture script. Note that equivalent here does not
mean that the automata have the same behaviors, but that the reachability analysis of
one can be used for the reachability analysis of the other.