1. Give an example of a timed automaton whose underlying graph is connected, but no accepting state is reachable.

2. Can you give an example of a timed automaton whose underlying graph is connected, but no accepting state is reachable, and whose only guards are upper bound guards: that is guards of the form $x < c$ or $x \leq c$ where $c \in \mathbb{N}$? Note that there could be multiple upper bound guards with different constants.

3. The same question as above but now assume that the automaton has only lower bound guards: that is, guards of the form $x \geq c$ or $x > c$.

4. Let Z be the zone defined by $-3 \leq y - x \leq 4$. Can you construct an automaton whose zone graph contains a node (q, Z)?

5. Provide an example of an automaton with a single state, $n \geq 2$ clocks and with $M_x = 1$ for each clock x, such that the zone graph computed by Algorithm 1.3 in the notes gives at least 2^n nodes.

6. Let $\mathcal{A}$ be an automaton with a single clock. Are simulation relations necessary? Is there an example of such an automaton for which Algorithm 1.1 does not terminate?