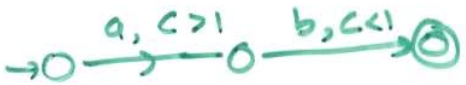
Emptiness problem

- Given G, $T_m(G) = \emptyset$?

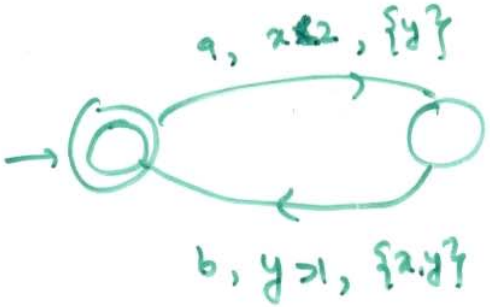


Marked activity state reachable yet $T_m(G) = \emptyset$.

- Given $T \subseteq (\Sigma \times \mathbb{R}_+)^*$ define

untime$(T) \subseteq \Sigma^*$ to be lang. obtained by projecting timed traces of T onto Σ^* (by ignoring event occurrence times)

Example:



untime$[T_m(G)] = (ab)^*$

- Lemma: $T = \emptyset$ iff untime$(T) = \emptyset$.

$\Rightarrow$ suffices to check emptiness of untime(T)

- Construct an untimed automaton R, called region automaton, such that $L_m(R) =$ untime$(T_m(G))$

- Important result (Alur & Dill, 91): R finite state machine

$\Rightarrow$ emptiness of $L_m(R)$ can be verified.