# Theorem 1

the duration bounded reachability problem $A, R_0, R_f, p \in I$ )

and let $m \in \mathbb{N}$ be the right endpoint of interval $I$.

By Lemma 5, we get the no. of m-constrained bounded labeled regions to be exponential to the length of the problem.

By combining Lemma 2,3,4, we get exponential-time decision procedure for solving the problem.

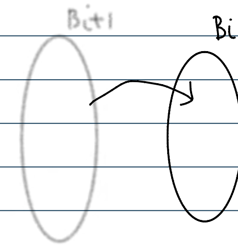
**Theorem**: $m \in \mathbb{N}$ be the right end point of the interval $I \subseteq \mathbb{R}$.

The DBRP $(A, R_0, R_f, \int p \in I)$ is "Yes" iff

$\exists B_k \cdots B_0$ of m-constrained BLR of $A$ such that

1. The bounded graph $B_{P,R_f}(A)$ contains an edge to $R_f$ from some bounded region $B$ with $\gamma(B) = B_0$
2. $\forall\, 0 \leq i < k$, $B_{P,R_f}(A)$ contains an edge to $B_i$ from some BLR $B$ with $\gamma(B) = B_{i+1}$
3. $I(B_K) \cap I = \phi$ and the clock region of $B_K$ is $R_0$.

1. Need to explore only the m-constrained BLR.
2. The no. of predecessors is finite.




The no. of pred corresponds to that of clock regions.

3. For each $B_{i+1}$, if not an m-constrained BLR, replace by $\cong_m$- equivalent m-constrained BLR $\gamma(B_{i+1})$
4. DBRP holds if $\exists B \mid I(B) \cap I = \phi$ is found.
5. If not, then not reachable.
6. The time complexity is proportional to the no. of m-constrained B [By Lemma 5].
7. The space complexity of the search is PSPACE. Because a m-constrained BLR is polysize w.r.t. the problem LR and the calculation of the predecessor also takes polysize.

Corollary: The DBRP for a Timed automata is in PSPACE

This infers from the fact that Reachability problem b/w the clock regions is PSPACE-hard.