

D digraph with minimal indegree  $> 0$  and minimal outdegree  $> 0$ . Suppose  $R_k^+ = R_k^-$  for some  $k \geq 1$ . Then

$$R^+ = R_k^+ = R_k^- = R^-$$

## 2. Equivalence classes of $R^+, R^-$

$v \in V(D)$

$N_k^+(v)$  ... set of end vertices of all dipaths with starting vertex  $v$  and length  $k$

$N_k^-(v)$        $|N_1^+(v)| = \text{out}(v)$

$|N_1^-(v)| = \text{in}(v)$

$S \subset V(D)$

$$N_k^+(S) = \bigcup_{v \in S} N_k^+(v)$$