Properties of relations

Properties of a relation on A:

Reflexivity R is ***reflexive*** if

$\forall x \in A.\ xRx.$

"Everyone likes themselves."

Every node in G has a loop.

Irreflexivity R is ***irreflexive*** if

$\neg\exists x \in A.\ xRx.$

"No one likes themselves."

There are no loops in G.

Symmetry R is ***symmetric*** if

$\forall x, y \in A.\ xRy \ \Rightarrow\ yRx.$

"If x likes y, then y likes x."

If there is an edge from x to y in G, then there is an edge from y to x in G as well.

Antisymmetry R is ***antisymmetric*** if

$\forall x, y \in A.\ (xRy \wedge yRx) \ \Rightarrow\ x = y.$

"No pair of distinct people like each other."

There is at most one directed edge between any pair of distinct nodes.

Transitivity R is ***transitive*** if

$\forall x, y, z \in A.\ (xRy \wedge yRz) \ \Rightarrow\ xRz.$

"If x likes y and y likes z, then x likes z too."

For any walk $v_0, v_1, \ldots, v_k$ in G where $k \geq 2$, $v_0 \to v_k$ is in G (and, hence, $v_i \to v_j$ is also in G for all $i < j$).