

# My definition of circular relations

User 2473 • 21 Jan 2025

This is my first post on this blog. This post is about one of the first mathematical definitions I ever made in my life, which I call circular relations. A circular relation is a binary relation  $R$  on a set  $S$ , such that the following property holds:

$$(\forall x)(\forall y)(\forall z)((xRy \wedge yRz) \rightarrow zRx).$$

Note the contrast with transitivity, where instead of  $xRz$  in the consequent, we have  $zRx$ . An example of a relation having this property is the “defeats” relation in the game of Rock-Paper-Scissors: Rock defeats Scissors, Scissors defeats Paper, but Paper defeats Rock. My next post will be about proving a theorem about circular relations, namely that a binary relation  $R$  is an equivalence relation if and only if  $R$  is both a reflexive and circular relation.