

1 Binary relations

1.1 Completeness

A relation R in set X is complete, if

$$xRy \vee yRx \quad \forall \quad x, y \in X$$

1.2 Transitivity

A relation R in set X is transitive, if

$$xRy \wedge yRz \quad \longrightarrow \quad xRz \quad \forall \quad x, y, z \in X$$

1.3 Symmetry

A relation R in set X is symmetric, if

$$xRy \quad \longrightarrow \quad yRx \quad \forall \quad x, y \in X$$

1.4 Monotonicity

A (preference) relation R in set X is monotonic, if

$$x \gg y \quad \longrightarrow \quad x \succ y \quad \forall \quad x, y \in X$$

1.5 Convexity

A (preference) relation R in set X is (strictly) convex, if

$$x \succ y \quad \longrightarrow \quad (1 - \lambda)x + \lambda y \succ y \quad \forall \quad \lambda \in (0, 1), \quad x, y \in X$$

1.6 Antisymmetry

A binary relation R in set X is antisymmetric, if

$$xRy \wedge yRx \quad \longrightarrow \quad y = x \quad \forall \quad x, y \in X$$

1.7 Asymmetry

A binary relation R in set X is asymmetric, if

$$xRy \quad \longrightarrow \quad \neg(yRx) \quad \forall \quad x, y \in X$$

1.8 Reflexivity

A binary relation R in set X is reflexive, if

$$xRx \quad \forall \quad x \in X$$