

Math 55 Discussion problems 18 Apr

1. Show that the relation $R = \emptyset$ on a nonempty set S is symmetric and transitive, but not reflexive.
2. Show that the relation R on a set A is antisymmetric if and only if $R \cap R^{-1}$ is a subset of the diagonal relation $\Delta = \{(a, a) | a \in A\}$.
3. Show that a subset of an antisymmetric relation is also antisymmetric.
4. Suppose that R is a symmetric relation on a set A . Is \bar{R} also symmetric?
5. Show that the relation R consisting of all pairs (x, y) such that x and y are bit strings of length three or more that agree except perhaps in their first three bits is an equivalence relation on the set of all bit strings of length three or more.
6. Let R be the relation on the set of ordered pairs of positive integers such that $((a, b), (c, d)) \in R$ if and only if $ad = bc$. Show that R is an equivalence relation.
7. Which of these collections of subsets are partitions of $\{-3, -2, -1, 0, 1, 2, 3\}$?
 - (a) $\{-3, -1, 1, 3\}, \{-2, 0, 2\}$
 - (b) $\{-3, -2, -1, 0\}, \{0, 1, 2, 3\}$
 - (c) $\{-3, 3\}, \{-2, 2\}, \{-1, 1\}, \{0\}$
 - (d) $\{-3, -2, 2, 3\}, \{-1, 1\}$