

Discrete Mathematical Structures (UCS405)

Tutorial Sheet-3

- Let $A = \{1, 2, 3, 4\}$, and R is a relation defined by “ a divides b ”. Write R as a set of ordered pair, draw directed graph.
- List the ordered pairs in the relation R from $A = \{0, 1, 2, 3, 4\}$ to $B = \{0, 1, 2, 3\}$, where $(a, b) \in R$ if and only if
 - $a = b$.
 - $a + b = 4$.
 - $a > b$.
 - $a \mid b$.
 - $\gcd(a, b) = 1$.
 - $\text{lcm}(a, b) = 2$.
- Let $A = \{1, 2, 3, 4\}$, give an example of a mapping which is (i) neither symmetric nor antisymmetric, (ii) anti-symmetric and reflexive but not transitive, (iii) transitive and reflexive but not anti-symmetric.
- For each of these relations on the set $\{1, 2, 3, 4\}$, decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric, and whether it is transitive.
 - $\{(2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)\}$
 - $\{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)\}$
 - $\{(2, 4), (4, 2)\}$
 - $\{(1, 2), (2, 3), (3, 4)\}$
 - $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$
 - $\{(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)\}$
- Let $R_1 = \{(1, 2), (2, 3), (3, 4)\}$ and $R_2 = \{(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3), (3, 4)\}$ be relations from $\{1, 2, 3\}$ to $\{1, 2, 3, 4\}$. Find
 - $R_1 \cup R_2$.
 - $R_1 \cap R_2$.
 - $R_1 - R_2$.
 - $R_2 - R_1$.
- Let R be the relation $\{(1, 2), (1, 3), (2, 3), (2, 4), (3, 1)\}$, and let S be the relation $\{(2, 1), (3, 1), (3, 2), (4, 2)\}$. Find $S \circ R$.
- List the 16 different relations on the set $\{0, 1\}$.
 - How many of the 16 different relations on $\{0, 1\}$ contain the pair $(0, 1)$?
 - Which of the 16 relations on $\{0, 1\}$, which are
 - reflexive?
 - irreflexive?
 - symmetric?
 - antisymmetric?
 - asymmetric?
 - transitive?
- Let R be the relation on the set $\{1, 2, 3, 4, 5\}$ containing the ordered pairs $(1, 1), (1, 2), (1, 3), (2, 3), (2, 4), (3, 1), (3, 4), (3, 5), (4, 2), (4, 5), (5, 1), (5, 2)$, and $(5, 4)$. Find
 - R^2 .
 - R^3 .
 - R^4 .
 - R^5 .