Sections 4.2 Relations

Let A and B be sets. A relation from A to B is a subset of $A \times B$. If $(a, b) \in R$, we can also write aRb or say "a is R-related to b."

If R is a relation from A to B, the domain of R is the set

$$\text{Dom } (R) = \{x \in A : \exists y \in B \text{ s.t. } (x, y) \in R\}.$$

If R is a relation from A to B, the range of R is the set

$$\text{Rng } (R) = \{y \in B : \exists x \in A \text{ s.t. } (x, y) \in R\}.$$

If R is a relation from A to B, the inverse of R is the relation

$$R^{-1} = \{(y, x) : (x, y) \in R\}.$$

If R is a relation from A to B and S is a relation from B to C, the composition of R and S is the relation

$$S \circ R = \{(a, c) : \exists b \in B \text{ s.t. } (a, b) \in R \text{ and } (b, c) \in S\}.$$