

1. A **relation** R on A is

2. Examples

3. Suppose R is a relation on the set A .

(a) We say R is **symmetric** if

(b) We say R is **reflexive** if

(c) We say R is **transitive** if

4. Let R be the relation on $A = \{0, 1, 2, 3, 4\}$ defined as $a R b$ if $a \mid b$. List all the elements in R . What is the smallest positive number you could add to the set A that would increase the order R as much as possible?
5. Let R be a relation on $A = \mathbb{Z}$ defined by $a R b$ if $a \equiv b \pmod{3}$. Find three elements of R that contain zero in the first coordinate, find three elements of R that contain 1 in the second coordinate, and find three ordered pairs in $\mathbb{Z} \times \mathbb{Z}$ that are not in R .
6. Suppose R is a relation on $\mathcal{P}(A)$ where $A = \{0, 1, 2, 3, 4\}$ defined as $X R Y$ if $X \cap Y \neq \emptyset$. List 5 elements in R and 3 elements of $\mathcal{P}(A) \times \mathcal{P}(A)$ that are not in R .
7. For each relation above determine if it is symmetric, reflexive or transitive. Make a formal argument/proof of your conclusion.