

**Definition** (Preorder). A *preorder* is a tuple  $\langle \mathbf{P}, \leq_{\mathbf{P}} \rangle$ , where  $\mathbf{P}$  is a set (also called the *carrier set*), together with a relation  $\leq_{\mathbf{P}}$  that is

1. *Reflexive*: For all  $x \in \mathbf{P}$ ,  $x \leq_{\mathbf{P}} x$ .
2. *Transitive*: For all  $x, y, z \in \mathbf{P}$ , if  $x \leq_{\mathbf{P}} y$  and  $y \leq_{\mathbf{P}} z$ , then  $x \leq_{\mathbf{P}} z$ .