

Name:

Problem 1: *Let X be a set. Give the definition of a metric on X .*

Solution: A metric is a function $d: X \times X \rightarrow \mathbb{R}$ such that

- (Nonnegativity) For all $x, y \in X$, $d(x, y) \geq 0$, with $d(x, y) = 0$ if and only if $x = y$.
- (Symmetry) For all $x, y \in X$, $d(x, y) = d(y, x)$.
- (Triangle inequality) For all $x, y, z \in X$, $d(x, z) \leq d(x, y) + d(y, z)$.