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Problems for Quiz 1

January 29, 2019

1. Let (X, d) be a metric space, and let $f : X \to \mathbb{R}$ be a continuous function. Prove that the function

$$d'(x, y) \quad = \quad d(x, y) \; + \; |f(x) - f(y)|$$

also defines a metric on X.

2. Let $r(x, y) = |x^2 - y^2|$, where x and y are real numbers. Prove that r defines a metric on the set $[0, \infty)$ of nonnegative reals but does not define a metric on the set $\mathbb{R}$ of all real numbers.