MA30041: Metric Spaces

SELF-ASSESSMENT SHEET 7: HOMEOMORPHISMS

1.) Let (X, d) and (Y, d') be metric spaces and let $f : X \to Y$ be a surjective isometry. Prove that f is a homeomorphism.
For a solution, click on the the following space:

2.) Show that if (X, d) is a discrete metric space and (Y, d') is any metric space, then any function $f : X \to Y$ is continuous.
Use each of the (following) three equivalent criteria for continuity directly!
For a solution, click on the the following spaces:

- ε-δ proof:

- proof by sequences:

- proof using open sets:

3.) Let (X, d) and (Y, d') be discrete metric spaces. Show: Any bijective map $f : X \to Y$ is a homeomorphism
For a solution, click on the the following space:

4.) Show that $\mathbb{R}$ and $(0, \infty)$, both equipped with the usual metric, are homeomorphic
For a solution, click on the the following space: