HW

1. Prove that $\mathbb{R}^n$ minus a finite number of points is path connected.

2. Prove that a continuous function takes path connected sets to path connected sets. Conclude that $\mathbb{RP}^n$ is path connected.

3. A space is called totally disconnected if its only connected subsets are one-point sets. Show that a finite Hausdorff space is totally disconnected.

4. Show that no two of the spaces $(0, 1)$, $(0, 1]$, and $[0, 1]$ are homeomorphic.

5. Show that if U is an open connected subset of $\mathbb{R}^2$, then U is path connected.