Exercise Sheet 4

Exercise 4.1: Homeomorphism vs. Homotopy Equivalence

Which relation is stronger? Homeomorphism or Homotopy equivalence?

Exercise 4.2: Homotopy Equivalence in Trees

Consider two finite trees $T_1$ and $T_2$ without root or order. When are $T_1$ and $T_2$ homotopy equivalent.

Exercise 4.3: Homotopy Equivalence Example

Consider the three spaces indicated below.
Show that they are homotopy equivalent although there does not exists a retraction for each pair of spaces, that transforms one into the other.

Exercise 4.4: Homotopy Equivalence and contractible spaces

Prove the following observation/example from the lecture:
Let $X$ be a topological space, and $Y$ a contractible space. Then $X$ is homotopy equivalent to $X \times Y$. 