

Math 540: Exercises for Week 2

Reading: Hatcher Section 1.1

1. Hatcher 0.17
2. Hatcher 1.1.1
3. Hatcher 1.1.3
4. Hatcher 1.1.5 (Be careful about basepoints.)
5. Hatcher 1.1.7
6. Recall that the disjoint union topology is characterized by the following property: given spaces X , Y , and Z and continuous maps $f: X \rightarrow Z$, $g: Y \rightarrow Z$, there is a unique continuous map $h: X \amalg Y \rightarrow Z$ such that the following diagram commutes.

$$\begin{array}{ccc} X \amalg Y & \longleftarrow & Y \\ \uparrow & \text{---} h \text{---} & \downarrow g \\ X & \xrightarrow{f} & Z \end{array}$$

That is, disjoint union is the coproduct in the category of topological spaces. What operation has the analogous property for based spaces? Formulate this property precisely and prove your answer.