Before beginning this homework assignment, please review the guidelines for submitting homework. Please write down the total amount of time spent working on the assignment at the top of what you turn in. Remember that at least one problem from each assignment must be written in \LaTeX.

1. **GROUPS AND TOPOLOGIES**

Groups and topologies are two important ways of “dressing up sets” to make them useful in certain contexts. There are entire courses (both graduate and undergraduate) devoted to these topics, so you shouldn’t expect to completely understand them now. At the moment, they are mostly good playgrounds for working with our proof techniques and set operations.

   (1) Read Taylor, Sections 4.3 and 4.4. All of the following problems are from Taylor’s text.

   (2) Prove Theorem 4.3.4.

   (3) Prove Theorem 4.3.6.

   (4) Prove Theorem 4.3.7. (Hint: Let $\mathcal{H}$ be the set whose elements are the subgroups $H$ of $G$ such that $P \subseteq H$.)


   (6) Prove Theorem 4.4.16.