

You are expected to do the following problems to a high standard (i.e., at least well enough to be published in a textbook) for full credit. Five of these problems will be selected (by Jon) for grading, with each worth 4 points.

1. [Baker 4.2.7] Prove Theorem 4.2.1.
2. [Baker 4.2.8] Prove Theorem 4.2.3.
3. [Baker 5.3.14] Prove that the set $\times\{F_i : i \in \Lambda\}$ given in example 4.3.15(d) is a closed subset of the product space X .
4. Suppose that the indexing set Λ in #3 were changed to be $(0,1)$. Is $\times\{F_i : i \in \Lambda\}$ still closed in the product space X ?
5. [Baker Th 5.1.10] Two nonempty subsets A and B of a topological space X are said to be *separated* provided that $\text{Cl}(A) \cap B = A \cap \text{Cl}(B) = \emptyset$. Prove that a space X is connected iff X is not the union of two separated sets.
6. [Baker 5.2.7] Complete the proof of Theorem 5.2.1.
7. [Baker 5.2.11] Prove Corollary 5.2.12.
8. [Baker 5.2.12] Prove Corollary 5.2.13