

1. Munkres 17.9
2. Munkres 17.13
3. Munkres 17.14
4. Munkres 17.17
5. Munkres 17.19
6. A set $A \subseteq X$ is said to be *dense* in X if $\bar{A} = X$. A topological space is *second countable* if it admits a countable basis.
 - a) Suppose X is second countable. Prove that it has a countable dense subset.
 - b) Prove that a metric space is second countable if and only if it has a countable dense subset.
7. A topological space X is said to be locally Euclidean (of dimension n) if for every $x \in X$ there is an open set U that is homeomorphic to an open subset of $\mathbb{R}^n$. A topological n -manifold is a topological space that is locally Euclidean of dimension n , Hausdorff, and second countable.

Show that the product of an n -manifold N and an m -manifold M is an $n + m$ manifold.