1(nc). A topological space is **irreducible** if it is nonempty and cannot be written as a union of two proper closed subsets. A subset of a topological space is **irreducible** if it is irreducible as a topological space (with the induced topology). Show that a Noetherian topological space is a finite union of irreducible subsets.

2. Let $R$ be a ring.
   
   (a). Show that $\text{Spec } R$ is quasi-compact (i.e., for any open cover of $\text{Spec } R$, there is a finite subcover).
   
   (b). Show that if $R$ is Noetherian then every open subset of $\text{Spec } R$ is quasi-compact.
   
   (c). Give an example of a ring $R$ and an open subset of $\text{Spec } R$ that is not quasi-compact.

3. Exercise 3.18 (page 114).

   Note that starred exercises have hints in the back of the book. They will be graded on the assumption that you have read those hints.