1. Suppose \([a,b]\) is an interval of real numbers with the usual topology, and let \(f:[a,b] \to \mathbb{R}\), the reals again with the usual topology, be continuous. Prove that if \(c\) is a real number between \(f(a)\) and \(f(b)\), then there is an \(x \in [a,b]\) such that \(f(x) = c\).

2. Suppose \(A\) is a connected subset of a topological space. For each of the following, if the set is always connected, prove it; if not, give a counterexample.
   a) \(\text{cl}A\)  
   b) \(\text{int}A\)  
   c) \(\text{Fr}A\)  
   d) \(A'\)