(1) let $U \subset R^n, V \subset R^m$ be open. Show that $U \times V \subset R^{n+m}$ is open.
(2) let $A \subset R^n, B \subset R^m$ be closed. Show that $A \times B \subset R^{n+m}$ is closed.
(3) Given a set $A \subset R^n$ and a point $p \in R^n$ we say that p is a *limit point* of A if there exists a sequence of points $p_n \in A$ such that $p_n \neq p$ for any n and $p_n \to p$ as $n \to \infty$.
   (a) Show that if A is closed then A contains every limit point of A.
   (b) is it true that every boundary point of A is a limit point of A? If yes, prove it. if now, give a counterexample.
   (c) is it true that every limit point of A is a boundary point of A? If yes, prove it. if now, give a counterexample.
   (d) Give an example of a closed set for which every limit point is a boundary point.
(4) let $f\colon R^n \to R^m$ be a continuous map. Is it true that image of every closed set under f is closed? prove or give a counterexample.
(5) Let $\{p_k\}_{k=1}^{\infty} \in R^n$. Prove that $p_k \to p$ as $k \to \infty$ if and only if $\lim_{k\to\infty} |p_k - p| = 0$.
(6) Let $f\colon R^n \to R^m$ and $g\colon R^m \to R^k$. Suppose f is continuous at p and g is continuous at $f(p)$. Using the definition prove that $g \circ f$ is continuous at p.

Extra Credit Problem (to be written up and submitted separately)

Let$A \subset R^n$ satisfy the property that for every sequence $p_n \in A$ there is a convergent subsequence $p_{n_k} \to p$ and $p \in A$. Prove that A is compact.