(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) Let X be a metric space. let $A \subset X$ be a subset of X. Prove that $Lim(A)$ is closed.
(4) Let X be a metric space. let $A \subset X$ be a subset of X.
    (a) Show that if $A \subset C \subset X$ and C is closed then $Cl(A) \subset C$.
    (b) Show that $Cl(A)$ is equal to the intersection of all closed subsets of X containing A.
(5) 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.
(6) Using only the definition of continuity show that if $f\colon X \to R^n$ and $g\colon X \to R^m$ are continuous then $(f, g)\colon X \to R^{n+m}$ is continuous.
(7) Find $br(A), Lim(A)$ and $Cl(A)$ for the following sets.
    (a) $A = \{0 < x^2 + y^2 \leq 1\} \subset \mathbb{R}^2$.
    (b) $A = (0, 1) \times \{0\} \subset \mathbb{R}^2$.
    (c) $A = \{(x, y) \in \mathbb{R}^2 |$ such that $x > 0, y < \sin(1/x)\} \subset \mathbb{R}^2$.
(8) Let $f\colon X \to Y$ and $g\colon Y \to Z$ where X, Y, Z are metric spaces. Suppose f is continuous at p and g is continuous at $f(p)$. Using only the definition prove that $g \circ f$ is continuous at p.
(9) Let $f, g\colon X \to \mathbb{R}$ are continuous at p. Using only the definition prove that $f \cdot g\colon X \to \mathbb{R}$ is continuous at p.

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

Give an example of a nonempty set $A \subset \mathbb{R}$ such that $A = br(A) = Lim(A) = Cl(A)$.