Homework assignment, September 24, 2007.

1. Give the definition of $\lim_{x \to x_0} f(x)$ for a function f acting from one topological space to another.

2. Give an example of a continuous function f and an open set U such that $f(U)$ is not open.

3. Prove that $\mathrm{Cl}(\mathrm{Cl}(A)) = \mathrm{Cl}\, A$. The easiest way is to use the characterization as the smallest closed set. . .

4. Prove that in a metric space the closure of a set A is the set of all limits of sequences in A. Probably the easiest way is to show that the set of limits is closed (i.e its complement is open), and that any point in the closure can be represented as a limit.