1, Given: A is an open subset of R^d, $A \cap \overline{B} \neq \emptyset$. Show: $A \cap B \neq \emptyset$.

2.Given: U is an open subset of R^d

a) Show: $U \subseteq (\overline{U})^{\circ}$

b) Can we have $U \neq (\overline{U})^{\circ}$?

3. Given: A is a subset of R^d. Show: $A' = (\bar{A})'$ (A' =set of all limit points of A)

4.For $A \subseteq R^d$, diameter of A, $\mathbf{diam(A) = sup} \{\| x - y \|: x, y \in A\}$

a) Show that diam(A)<∞ if and only if, A is bounded.

b) Show that if A is compact then there exist x0,y0 ∈ A such that $diam(A) = \| x0 - y0 \|$

5.Given a sequence {Xn} in R^d, $x \in R^d$, consider the statements

a) given any nbd(=neighborhood) U of x, {n: Xn $\in U$} is infinite.

b) given any nbd U of x, {Xn} is frequently in U (for every n $\in N$, there exists k>n, such that $X_k \in U$).

c) there is a subsequence of {Xn} that converges to X.

show: 1): a$\Longrightarrow b$

2): b$\Longrightarrow c$

3): c$\Longrightarrow a$