Directions. Please submit your answer to the following problem in a \LaTeX-prepared document. Class participants are encouraged to prepare solutions in a collaborative mode but to prepare their to-be-submitted write-ups individually. The consequences of sharing files, electronic or otherwise, are discussed in the course syllabus.\footnote{If the wording of this problem was discussed in detail in the classroom, the course instructor expects to see similar phrases and sentences in reading the submissions.}

Please include the problem number along with a statement of the problem in your submission. Please also include your e-mail address.

Recall the following definition. A subset, $K$, of a metric space, $(M, d)$ is \textbf{compact} if every open covering of $K$ contains a finite sub-covering, i.e., if $\mathcal{C}$ is a collection of open subsets of $M$ such that $K \subseteq \bigcup_{U \in \mathcal{C}} U$, then there exist a finite number of elements of $\mathcal{C}$, call them $U_1, \ldots, U_n$ such that $K \subseteq \bigcup_{i=1}^{n} U_i$.

\textbf{Problem.}

A. Prove that a compact subset of a metric space is closed and bounded.

B. Does the statement of part A have a converse?