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.

\textbf{Problem.} Prove the following statement. Let $A$ and $B$ be subsets of a non-empty set $S$ with characteristic functions $f_A$ and $f_B$ respectively. Then

\[ f_{A \cap B} = f_A f_B \]

where $f_{A \cap B}$ is the characteristic function of $A \cap B$. 