9 Discrete Mathematics (gw104)

(a) What does it mean for a function to be an injection, a surjection, and a bijection? [4 marks]

(b) For sets $A$ and $B$, define without proof a bijection from $\mathcal{P}(A \times B)$ to $[A \Rightarrow \mathcal{P}(B)]$ and its inverse. [4 marks]

(c) For sets $A$, $B$ and $C$, define without proof a bijection from $[(A \times B) \Rightarrow C]$ to $[A \Rightarrow (B \Rightarrow C)]$ and its inverse. [4 marks]

(d) Let $X$ be a set. Prove there is no injection $f : \mathcal{P}(X) \rightarrow X$.
   [Hint: Consider the set $W = \{f(Z) \mid Z \subseteq X \land f(Z) \notin Z\}$.] [8 marks]