

COMPUTER SCIENCE TRIPOS Part IA – 2019 – Paper 2

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 $W = \{f(Z) \mid Z \subseteq X \wedge f(Z) \notin Z\}$.]
[8 marks]