7 Algorithms (FMS)

(a) Consider the radix sort algorithm.

(i) Explain how radix sort works, to what inputs it can be applied and what its asymptotic complexity is. [5 marks]

(ii) Explain why running radix sort does not proceed from most to least significant digit, as would at first seem more intuitive. [4 marks]

(iii) Give a proof by induction of the correctness of radix sort. [4 marks]

(b) Clearly describe an algorithm, strictly better than $O(n^2)$, that takes a positive integer $s$ and a set $A$ of $n$ positive integers and returns a Boolean answer to the question whether there exist two distinct elements of $A$ whose sum is exactly $s$. Evaluate its complexity. [7 marks]