5 Foundations of Computer Science (LCP)

*This question has been translated from Standard ML to OCaml*

(a) This question concerns the data structure of queues.

(i) Describe the primitive queue operations. [3 marks]

(ii) Describe an efficient implementation of queues, presenting code fragments as appropriate (a complete program listing is not required). [3 marks]

(iii) Carefully discuss the efficiency of your implementation, using the concept of amortised time. [4 marks]

(b) Write an OCaml function to compute all permutations of its argument, a list. (You may assume that the elements of this list are distinct.) For example, given the argument \([1; 2; 3]\), the result should be a list consisting of the elements \([1; 2; 3]\), \([2; 1; 3]\), \([2; 3; 1]\), \([1; 3; 2]\), \([3; 1; 2]\) and \([3; 2; 1]\) in any order. For full credit, your code must be well structured and clearly explained. [10 marks]