# 1993 Paper 10 Question 7

**Data Structures and Algorithms**

Show that comparison-based sorting uses at best about $n \log n$ comparisons if there are $n$ things to be sorted. [5 marks]

Compute the expected inefficiency ratio from using linear insertion as against an $O(n \log n)$ sort on lists of 16 and 32 objects. This is the ratio by which the expected number of comparisons exceeds the theoretical minimum. [5 marks]

Show that binary insertion may reasonably be expected to be an $O(n \log n)$ sort. [5 marks]

About how many comparisons would you expect to take place when sorting 1024 7-bit values by binary insertion? [5 marks]