



QUESTION WORKBOOK

Algorithms, sorting and bin packing

Decision Mathematics 1 · Year FM

6 questions · 24 marks

PRINT EDITION

SECTION A · Warm-up

A1 Define an algorithm, and explain what is meant by its order. [2]

A2 Apply bubble sort to 5, 12, 3, 9, 1, writing the list after each pass. [3]

SECTION B · Standard

B1 Apply quick sort to 5, 12, 3, 9, 1, taking the middle item as pivot each time and taking the right-hand of two middle items. Show every stage. [5]

- B2** Pack the items 3, 6, 4, 8, 5, 7, 2, 9, 1 into bins of size 10 by first fit, and state the lower bound. [4]

- B3** Explain why first fit decreasing usually beats first fit, and why neither is guaranteed to be optimal. [3]

SECTION C · Stretch

- C1** The items 6, 1, 6, 1, 6, 1, 7, 7, 7 are to be packed into bins of size 10. Apply first fit and state the lower bound. Then prove that no packing can use five bins. [7]