Write your answers in the D1 answer book for this paper.

1.

16 23 18 9 4 20 35 5 17 13 6 11

The numbers in the list represent the weights, in kilograms, of twelve parcels. The parcels are to be transported in containers that will each hold a maximum weight of 45 kg.

(a) Calculate a lower bound for the number of containers needed. You must make your method clear.

(2)

(b) Use the first-fit bin packing algorithm to allocate the parcels to the containers.

(3)

(c) Carry out a bubble sort, starting at the left-hand end of the list, to produce a list of the weights in descending order. You should only give the state of the list after each pass.

(4)

(d) Use the first-fit decreasing bin packing algorithm to allocate the parcels to the containers.

(3)

(Total 12 marks)