6. The twelve numbers in the list below are to be packed into bins of size n, where n is a positive integer.

28 31 5 25 16 35 18 22 11 27 15 13

When the first-fit bin packing algorithm is applied to the list, the following allocation is obtained.

Bin 1: 28 31 5

Bin 2: 25 16 18 11

Bin 3: 35 22 15

Bin 4: 27 13

(a) Based on the packing shown above, determine the possible values of n. You must give reasons for your answer.

(3)

(b) The original list of twelve numbers is to be sorted into **ascending** order. Use a quick sort to obtain the sorted list. You should show the result of each pass and identify your pivots clearly.

(4)

When the first-fit decreasing bin packing algorithm is applied to the list, the following allocation is obtained.

Bin 1: 35 31 5

Bin 2: 28 27 16

Bin 3: 25 22 18

Bin 4: 15 13 11

(c) Determine the value of n. You must give a reason for your answer.

(2)

(Total for Question 6 is 9 marks)