

D1 Sorting Algorithms

Challenge 1

Use the Quicksort algorithm to rearrange the following list of flowers into alphabetical order.

Rose (R), Iris (I), Wallflower (W), Dahlia (D), Pansy (P), Lobelia (L), Azalea (A).

Indicate entries that you have used as pivots.

(5 marks)



Challenge 2

- (a) Use a bubble sort algorithm to rearrange the following numbers into ascending order, showing the new arrangement after each pass.

4, 7, 13, 26, 8, 15, 6, 56.

(4 marks)

- (b) Find the maximum number of comparisons needed to rearrange a list of eight numbers into ascending order.

(2 marks)



Challenge 3

Use a Shell sort algorithm to rearrange the following numbers into ascending order, showing the new arrangement after each pass.

14, 27, 23, 36, 18, 25, 16, 66

(6 marks)



Final Challenge

- (a) Apply the following algorithm to the list of data below.

41, 23, 12, 45, 17, 11, 26, 58, 3, 24

Step 1: Choose the first element in the current list; call it P .

Step 2: For each number in the list, put numbers less than P to the left of P , and numbers greater than P to the right of P , creating sub-lists, each maintaining the original order of numbers.

Step 3: If every sub-list has one element, then output the sub-lists in order. Otherwise go to **Step 1** and repeat for each sub-list, keeping the sub-lists in order. *(5 marks)*

- (b) Find the maximum number of comparisons needed to rearrange a list of ten numbers into ascending order using the algorithm from part (a). *(2 marks)*
- (c) Rearrange the list of numbers in part (a) so that the maximum number of comparisons would be required. *(1 mark)*

