

Question 4 [12 marks]:

The following is a sequence of eight numbers.

0	1	2	3	4	5	6	7
70	20	50	80	60	10	40	30

Use QuickSort to sort the numbers in the sequence in **ascending** order. Show the result of each step by showing the whole sequence in a new line with sorted numbers underlined.

Key idea of QuickSort

1. Initialize:

Choose a pivot.
Place head at the start.
Place tail at the end.

2. Compare Pivot to Head:

If pivot > head and head hasn't reached the end: move head right.
Return to step 2. Otherwise, proceed to step 3.

3. Compare Pivot to Tail:

If pivot \leq tail and tail hasn't reached the start: move tail left. Return to step 3.
Otherwise, proceed to step 4.

4. Check Head and Tail Position:

If they've met or crossed: swap pivot with tail. End process.
Otherwise, proceed to step 5.

5. Swap and Move:

Swap values at head and tail.
Move head right.
Move tail left.
Return to step 2.

	0	1	2	3	4	5	6	7
	70	20	50	80	60	10	40	30
Step 1	40	20	50	30	60	10	<u>70</u>	80
Step 2	30	20	10	<u>40</u>	60	50	<u>70</u>	80
Step 3	10	20	<u>30</u>	<u>40</u>	60	50	<u>70</u>	80
Step 4	<u>10</u>	20	<u>30</u>	<u>40</u>	60	50	<u>70</u>	80
Step 5	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	60	50	<u>70</u>	80
Step 6	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>50</u>	60	<u>70</u>	80
Step 7	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>50</u>	<u>60</u>	<u>70</u>	80
Step 8	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>50</u>	<u>60</u>	<u>70</u>	<u>80</u>