

# MAT2440, Quiz7, Spring2025

ID: \_\_\_\_\_ Name: \_\_\_\_\_

1. Given the pseudocode of the bubble sort algorithm:

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procedure bubblesort( $a_1, a_2, \dots, a_n$ : real numbers with  $n \geq 2$ )
 $n :=$  the length of  $\{a_i\}$ 
for  $i := 1$  to  $n - 1$ 
    for  $j := 1$  to  $n - i$ 
        if  $a_j > a_{j+1}$  then interchange  $a_j$  and  $a_{j+1}$ 
    { $a_1, a_2, \dots, a_n$  is in increasing order}
    
```

Use the bubble sort to sort 3, 1, 5, 7, 4 in increasing order, showing the lists obtained at each step with all the details.

Initialization:  $n=5$ ,  $\bar{i} = 1$  to 4,  $\bar{j} = 1$  to  $5 - \bar{i}$

$\bar{i}=1$

	$\bar{j}=1$	$\bar{j}=2$	$\bar{j}=3$	$\bar{j}=4$	
	3	1	1	1	
	↓	↔	↔	↔	
	1	3	3	3	
	↔	↔	↔	↔	
	5	5	5	5	
	↔	↔	↔	↔	
	7	7	7	7	
	↔	↔	↔	↔	
	4	4	4	4	

$\bar{i}=2$

	$\bar{j}=1$	$\bar{j}=2$	$\bar{j}=3$	
	3	1	1	
	↔	↔	↔	
	3	3	3	
	↔	↔	↔	
	5	5	5	
	↔	↔	↔	
	4	4	4	
	↔	↔	↔	
	7	7	7	

$\bar{i}=3$

	$\bar{j}=1$	$\bar{j}=2$	
	3	1	
	↔	↔	
	3	3	
	↔	↔	
	4	4	
	↔	↔	
	5	5	
	↔	↔	
	7	7	

$\bar{i}=4$

	$\bar{j}=1$	
	3	
	↔	
	3	
	4	
	↔	
	5	
	↔	
	7	

Done and we get

{ 3, 1, 5, 7, 4 } to { 1, 3, 4, 5, 7 }