Workshop 6 – Week 7 – Worksheet 6

Question 6.1 You are asked to show the operation of quicksort on the following keys.

For simplicity, use the rightmost element as the partition element:

2 3 97 23 15 21 4 23 29 37 5 23

For brevity, only the first and final result of each quicksort step will be shown. The pivot is marked in red.

2	3	97	23^1	15	21	4	23^2	29	37	5	23^3
2	3	5	23^2	15	21	4	23^3	29	37	97	23^1
2	3	5	23^2	15	21	4					
2	3	4	23^2	15	21	5					
2	3										
2	3										
2											
			23^2	15	21	5					
			5	15	21	23^2					
				15	21	23^2					
				15	21	23^2					
				15	21						
				15	21						
				15							
								29	37	97	23^1
								23^1	37	97	29
									37	97	29
									29	97	37
										97	37
										37	97
											97
2	3	4	5	15	21	23^2	23^3	23^1	29	37	97

Comment on the stability of quicksort and its behaviour on almost sorted inputs.

As can be seen by 23^3 appearing before 23^1, Quicksort is not stable. As can also be seen, lists which are almost sorted call quicksort with n-1 elements, which means quicksort must be called O(n) times, each of those quicksort calls operate on O(n) elements (rather than the O(log n) elements we see when we pick a pivot that is approximately in the middle of all the given values).