2) (10 pts) ALG (Sorting)

(a) (5 pts) Show the contents of the following array after each iteration of Bubble Sort. The result after both the first and last iteration have been included for convenience. (Note: due to the nature of this question, relatively little partial credit will be awarded for incorrect answers.)

index	0	1	2	3	4	5	6	7
Initial	12	27	6	1	33	19	4	15
1st iter	12	6	1	27	19	4	15	33
2nd iter	6	1	12	19	4	15	27	33
3rd iter	1	6	12	4	15	19	27	33
4th iter	1	6	4	12	15	19	27	33
5th iter	1	4	6	12	15	19	27	33
6th iter	1	4	6	12	15	19	27	33
7th iter	1	4	6	12	15	19	27	33

Grading: 1 pt per each row, to earn the point all values in the row have to be correct.

(b) (5 pts) The array shown below has been partitioned exactly once (first function call in a Quick Sort of an array.) Which element was the partition element? Why?

index	0	1	2	3	4	5	6	7
Initial	16	19	13	12	9	27	49	33

Partition Element Index: **5 (Grading: 1 pt)**

Partition Element Value: **27 (Grading: 1 pt)**

Reason it was the Partition Element:

It is the only value for each everything to the left of it is less than it and everything to the right of it is greater than it. (For 16, 19, 13 and 12, we have 9 to its right, so these four can't be the partition. 9 can't be the partition since 12 is to its left, 49 can't be the partition since 33 to is to its right, and 33 can't be the partition because 49 is to its left.)

Grading: 3 pts for the reason, the details in the ()'s need not be in student responses, but a clear understanding that the partition element is the one where everything to its left is less than it and everything to its right is greater than it is necessary for full credit. Award partial credit as necessary.