Feedback — Quicksort

Help Center

You submitted this quiz on **Mon 21 Sep 2015 8:13 PM EDT**. You got a score of **1.80** out of **3.00**. You can attempt again, if you'd like.

```
To specify an array or sequence of values in an answer, separate the value
s in
the sequence by whitespace. For example, if the question asks for the firs
t
ten powers of two (starting at 1), then the following answer is acceptable
:

     1 2 4 8 16 32 64 128 256 512

If you wish to discuss a particular question and answer in the forums, ple
ase
post the entire question and answer, including the seed (which can be used
 by
the course staff to uniquely identify the question) and the explanation (w
hich
contains the correct answer).
```

Question 1

```
(seed = 616734)
Give the array that results after applying the standard 2-way partitioning
subroutine from lecture to the following array:

    19 42 25 17 10 73 13 88 80 91 18 50

Your answer should be a sequence of 12 integers, separated by whitespace.

Recall, in the standard 2-way partitioning subroutine, the leftmost entry i
s the partitioning item.
```

You entered:

```
10  18  13  17  19  73  25  88  80  91  42  50
```

Your Answer		Score	Explanation
10 18 13 17 19 73 25 88 80 91 42 50	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

```
The correct answer is: 10 18 13 17 19 73 25 88 80 91 42 50

Here is the array before and after each exchange:

  i   j    0   1   2   3   4   5   6   7   8   9  10  11
-------------------------------------------------------
  0  12   19  42  25  17  10  73  13  88  80  91  18  50
  1  10   19  42  25  17  10  73  13  88  80  91  18  50
  1  10   19  18  25  17  10  73  13  88  80  91  42  50
  2   6   19  18  25  17  10  73  13  88  80  91  42  50
  2   6   19  18  13  17  10  73  25  88  80  91  42  50
  5   4   10  18  13  17  19  73  25  88  80  91  42  50
      4   10  18  13  17  19  73  25  88  80  91  42  50
```

Question 2

```
(seed = 152938)
Give the array that results after applying the standard 2-way partitioning
subroutine from lecture to the following array:

    A A B A B A B A B B A A

Your answer should be a sequence of 12 integers, separated by whitespace.

Recall, in the standard partitioning subroutine, the leftmost entry is the
partitioning
item and the scan stops on either side upon a key equal to the key in the p
```

artitioning item.

You entered:

A A A A A B B B B A A

Your Answer		Score	Explanation
A A A A A B B B B A A	✖	0.00	
Total		0.00 / 1.00	

Question Explanation

The correct answer is: A A A A A B B A B B B A

Here is the array before and after each exchange:

i	j	0	1	2	3	4	5	6	7	8	9	10	11
0	12	A	A	B	A	B	A	B	A	B	B	A	A
1	11	A	A	B	A	B	A	B	A	B	B	A	A
1	11	A	A	B	A	B	A	B	A	B	B	A	A
2	10	A	A	B	A	B	A	B	A	B	B	A	A
2	10	A	A	A	A	B	A	B	A	B	B	B	A
3	7	A	A	A	A	B	A	B	A	B	B	B	A
3	7	A	A	A	A	B	A	B	A	B	B	B	A
4	5	A	A	A	A	B	A	B	A	B	B	B	A
4	5	A	A	A	A	A	B	B	A	B	B	B	A
5	4	A	A	A	A	A	B	B	A	B	B	B	A
	4	A	A	A	A	A	B	B	A	B	B	B	A

Question 3

(seed = 515123)
Which of the following statements about quicksort are true? Check all that apply. Unless otherwise specified, assume that quicksort refers to the recursive, randomized version of quicksort (with no extra optimizations) and us

es the 2-way partitioning algorithm described in lecture.

Your Answer		Score	Explanation
☑ The number of compares to 3-way quicksort an array of N equal keys is ~ N.	✔	0.20	The sort is complete after the first partitioning step.
☐ The primary reason to use the first entry in the array as the partitioning item instead of the last entry is to guarantee performance (probabilistically).	✔	0.20	It is an arbitrary choice.
☐ The number of compares to quicksort an array of N items with only two distinct keys is linearithmic.	✖	0.00	This one is tricky. We first argue that the maximum depth of the recursion tree is 2 lg N. Since each level in the recursion tree makes no more than ~ N compares, this implies that there no more than ~ 2 N lg N compares in total. If a subarray contains all equal keys, each partitioning step divides the array in the middle, so the depth of the recursion is at most lg N once the subarray contains all equal keys. If a subarray does not contain all equal keys, then the partitioning step removes at least half of the keys equal to the partitioning item. Thus, once the depth of the recursion is lg N, any subarray has all equal keys. Thus, the maximum depth of the recursion is at most 2 lg N.

☐	✔	0.20	The expected number of compares only decreases from ~ 2 N ln N in the presence of equal keys.
The expected number of compares to quicksort an array of N keys can be substantially more (e.g., a constant factor) than ~ 2 N ln N if there are a large number of items with equal keys.			
☑	✔	0.20	Scan through the linked list, moving nodes { less than, equal to, greater than } the partitioning key into one of three linked lists and combine the linked lists.
Given a singly-linked list of N items and a partitioning item, it is straightforward to *stably* 3-way partition the singly-linked list using only a linear number of compares and constant extra memory.			

Total	0.80 / 1.00

Question Explanation