Quiz Submissions - Sorting Homework Quiz

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Retaken Attempt 2

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Submission View

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Question 1 Retaken — 5 / 5 points

For each sort, indicate whether it is stable or not.

- ✔ __2__ Quicksort
- ✔ __1__ Insertion sort
- ✔ __1__ Merge sort
- ✔ __2__ Heap sort
- ✔ __2__ Selection sort

1. Stable
2. Not stable

Question 2 Correct on previous attempt(s) — 5 / 5 points

For each sorting algorithm, select the proper order of growth. (Sorry, I can't get D2L to display the equations in-line with the text; it insists on putting equations alone on their own line.) Each choice will be used exactly once.

- ✔ __4__ Quicksort
- ✔ __3__ Merge sort
- ✔ __1__ Insertion sort
- __2__ Selection sort

1. on average, but approaches N^2 for sorted, or nearly sorted, data.

✔

✔ __5__ Heap sort

2. N^2

for both average and best case.

$N\ lg\ N$

3. in all cases, with a relatively low constant factor.

$N\ lg\ N$

on average, but with

4. N^2

worst case behavior (which may be avoided by first randomizing the data).

$N\ lg\ N$

5. in all cases, but with a relatively high constant factor.

→ Question 3 Retaken 7 / 9 points

For each statement, select the sorting algorithm it applies to.

✖ __2__ (1) Moves the minimum remaining element into position with each iteration of the main loop.

✔ __2__ Has order-of-growth N for nearly-sorted arrays.

✔ __4__ Partitions the array, then sorts the two partitions recursively.

✔ __3__ Splits the array in half, recursively sorts each half, then combines them.

1. selection sort
2. insertion sort
3. merge sort
4. quicksort
5. heap sort

✔	__4__		Needs to have the data randomized to avoid N^2 worst-case behavior.
✔	__5__		Uses the same data structure as a priority queue.
✘	__4__	(1)	Requires the least amount of data movement.
✔	__5__		Is absolutely guaranteed to have N lg N order of growth with no extra memory.
✔	__3__		Requires allocation of an auxiliary array the same size as the one being sorted.

Question 4 Correct on previous attempt(s) **2 / 2 points**

In a heap, what is the index of the left child of item i (assume the root is at index 0)?

Answer: 2i+1 ✔

Question 5 Correct on previous attempt(s) **2 / 2 points**

In a heap, what is the index of the right child of item i (assume the root is at index 0)?

Answer: 2i+2 ✔

Question 6 Correct on previous attempt(s) **2 / 2 points**

In a heap, what is the index of the parent of item i (assume the root is at index 0)?

Answer: (i-1)/2 ✔

→ **Question 7** Retaken **0 / 4 points**

Using the Quicksort partitioning algorithm we covered in class (which is the same as in the book), partition the following array using the first element as the partition element. In the first blank, write the contents of the resulting partitioned array as described in the quiz instructions.

62 73 31 78 98 37 82 37 13 80 99 55

Answer: 31 37 37 13 55 62 73 78 98 82 80 99 ✗ **(37 55 31 13 37 62 82 98 78 80 99 73)**

→ Question 8 Retaken — 6 / 6 points

Given this array:

27 82 41 124 62 31 94 47

show the recursive phases of performing a mergesort on this array. In the first blank, write the array contents after the final recursive call that sorts the sub-arrays of size 2. In the second blank, write the array contents after the recursive call that sorts the 2-element arrays into a pair of 4-element arrays. In the third blank, write the result of merging the 4-element arrays.

For example if the array were:

62 73 31 78 98 37 82 37

the answers would be:

62 73 31 78 37 98 37 82

31 62 73 78 37 37 82 98

31 37 37 62 73 78 82 98

Answer for blank # 1: 27 82 41 124 31 62 47 94 ✓ (33.33 %)

Answer for blank # 2: 27 41 82 124 31 47 62 94 ✓ (33.33 %)

Answer for blank # 3: 27 31 41 47 62 82 94 124 ✓ (33.33 %)

Question 9 Correct on previous attempt(s) — 6 / 6 points

Given this array:

27 82 41 31 62 124 94 47

show the array contents after each of the first three executions of the outer loop of insertion sort. You may use either the algorithm described in class, or the one in the book; the results would be the same.

In the first blank, write the array contents after the first time through the outer loop. In the second blank, write the array contents after the second time through the outer loop. In the third blank, write the array contents after the third execution of the outer loop.

For example if the array were:

73 62 78 31 98 37 82 37

the answers would be (note that the array does not change in the second iteration, since **78 > 73**):

62 73 78 31 98 37 82 37

62 73 78 31 98 37 82 37

31 62 73 78 98 37 82 37

Answer for blank # 1: 27 82 41 31 62 124 94 47 ✔ (33.33 %)

Answer for blank # 2: 27 41 82 31 62 124 94 47 ✔ (33.33 %)

Answer for blank # 3: 27 31 41 82 62 124 94 47 ✔ (33.33 %)

Question 10 Retaken — 3 / 5 points

Which of these are the rules for a max heap?

- ✔ ☑ Every row of the tree must be complete before the next row may start to fill.
- ✔ ☑ Every node must be greater than both children.
- ✘ ☑ The smallest element in the heap must be in the bottom row.
- ✘ ☑ The left child must be less than the right child.
- ✔ ☑ Every row of the tree grows left-to-right.

Question 11 Correct on previous attempt(s) — 8 / 8 points

For each array, use some scratch paper to write out the heap it would represent. Which of them represent valid heaps (select all that apply)?

- ✔ ☐ 124 82 94 27 62 31 41 47
- ✔ ☑ 124 82 94 62 27 31 41 47
- ✔ ☐ 124 62 94 47 82 31 41 27
- ✔ ☑ 124 82 94 47 62 31 41 27

Question 12 Correct on previous attempt(s) — 6 / 6 points

This array represents a valid max heap:

124 82 94 47 62 31 41 27

Use some scratch paper to draw the corresponding heap. In the first blank, write the array that results from deleting the maximum stack element.

In the second blank, write the array that results from removing the maximum element from the heap represented in the first blank.

In the third blank, write the array that results from inserting 71 into the heap represented in the second blank.

Answer for blank # 1: 94 82 41 47 62 31 27 ✔ (33.33 %)

Answer for blank # 2: 82 62 41 47 27 31 ✔ (33.33 %)

Answer for blank # 3: 82 62 71 47 27 31 41 ✔ (33.33 %)

Attempt Score: 52 / 60 - 86.67 %

Overall Grade (highest attempt): 52 / 60 - 86.67 %

Done