Started on	Thursday, August 31, 2023, 11:00 AM
State	Finished
Completed on	Thursday, August 31, 2023, 11:09 AM
Time taken	9 mins 2 secs
Grade	**5.00** out of 10.00 (**50%**)

Question 1
Correct
1.00 points out of 1.00

What is the asymptotic efficiency of an algorithm?

- ○ a.   The correctness of its results, as can be proved using a loop invariant.
- ● b.   How the running time of an algorithm increases with the size of the input, as the size of the input becomes arbitrarily large. ✔
- ○ c.   The speed of an algorithm when run on a specific computer.
- ○ d.   The amount of memory used by the algorithm in relation to the size of the data.
- ○ e.   All of the above.
- ○ f.   None of the above.

Your answer is correct.

The correct answer is:
How the running time of an algorithm increases with the size of the input, as the size of the input becomes arbitrarily large.

Question 2
Incorrect
0.00 points out of 1.00

Time complexity focuses on the worst case because...

- ○ a.   The worst case is an upper bound on the total time.
- ● b.   The worst case is often roughly as bad as the average case. ✘
- ○ c.   Any algorithm can have a good best case.
- ○ d.   The worst case provides a guarantee on the running time, even when nothing is known about the input.
- ○ e.   All of the above.
- ○ f.   None of the above.

Your answer is incorrect.

The correct answer is:
All of the above.

Question 3
Correct
1.00 points out of 1.00

What causes the difference between the best case $\Theta(n)$ and worst case $\Theta(n^2)$ time complexities for Insertion Sort?

- ○ a.   In the best case, the outer for loop only executes once.
- ○ b.   In the worst case, the outer for loop executes n times, where n is the size of the input.
- ● c.   In the best case, the inner while loop doesn't execute at all, but it executes the maximum possible number of times in the worst case. ✔
- ○ d.   In the best case, the inner loop executes $\Theta(n^2)$ times, leading to an overall time complexity of $\Theta(n^2)$.
- ○ e.   All of the above.
- ○ f.   None of the above.

Your answer is correct.

The correct answer is:
In the best case, the inner while loop doesn't execute at all, but it executes the maximum possible number of times in the worst case.

Question 4
Incorrect
0.00 points out of 1.00

According to the strictest definition of big-O, which of the following time complexities can be described as big-O of polynomial time?

- ○ a. $O(n)$
- ○ b. $O(n \lg n)$
- ○ c. $O(n^2)$
- ● d. $O(n^3)$ ✘
- ○ e.   All of the above.
- ○ f.   None of the above.

Your answer is incorrect.

The correct answer is:
All of the above.

Question 5
Correct
1.00 points out of 1.00

Why is Θ notation considered stronger than big-O notation?

- ● a.   Theta notation takes both an upper bound and a lower bound into account, whereas big-O just represents an upper bound. ✔
- ○ b.   Theta more accurately represents the actual number of machine language instructions a computer will execute.
- ○ c.   Theta applies across computers with different speed processors, whereas big-O is only comparable across processors of the same speed.
- ○ d.   Theta represents a worst case, whereas big-O represents an average case.
- ○ e.   All of the above.
- ○ f.   None of the above.

Your answer is correct.

The correct answer is:
Theta notation takes both an upper bound and a lower bound into account, whereas big-O just represents an upper bound.

Question 6
Correct
1.00 points out of 1.00

Merge sort uses which of the following techniques to implement sorting?

- a. Backtracking
- b. Greedy algorithm
- c. Divide and conquer ✔
- d. Dynamic programming
- e. None of the above.

Your answer is correct.

The correct answer is:
Divide and conquer

Question 7
Incorrect
0.00 points out of 1.00

If one unit of space is the amount of memory required to hold 1 item being sorted, and n items are being sorted, approximately how much space does Mergesort use?

- a. $n + 1$
- b. $2n$
- c. $n \lg n$ ✖
- d. n^2
- e. All of the above.

Your answer is incorrect.

The correct answer is:
$2n$

Question 8
Incorrect
0.00 points out of 1.00

If one unit of space is the amount of memory required to hold 1 item being sorted, and n items are being sorted, approximately how much space does Insertion Sort use?

- a. $n + 1$
- b. $2n$
- c. $n \lg n$
- d. n^2 ✖
- e. None of the above.

Your answer is incorrect.

The correct answer is:
$n + 1$

Question 9
Correct
1.00 points out of 1.00

When is insertion sort a good choice for sorting an array?

- a. Each component of the array requires a large amount of memory.
- b. Each component of the array requires a small amount of memory.
- c. The array has only a few items out of place. ✔
- d. The processor speed is fast.
- e. All of the above.
- f. None of the above.

Your answer is correct.

The correct answer is:
The array has only a few items out of place.

Question 10
Incorrect
0.00 points out of 1.00

Mergesort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

- a. The array elements are completely unsorted.
- b. Elements in each half of the array are sorted amongst themselves.
- c. Elements in the first half of the array are less than or equal to elements in the second half of the array.
- d. All of the above.
- e. None of the above. ✖

Your answer is incorrect.

The correct answer is:
Elements in each half of the array are sorted amongst themselves.