

Assessment Report

Week 4 Coachable Quiz

Shiva Reddy

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Joined on March 19, 2023

Completed in 2 hours and 8 minutes

- SCORES
- SKILL RATINGS
- SCORECARD
- CHALLENGE SOLUTIONS
- MULTIPLE CHOICE ANSWERS

Scores

Scores	Average	Qualifying	Final	Cheating
	77%	70%	95%	
Coding challenges × 50%			100%	Copy/Paste No
Multiple choice × 50%			90%	Plagiarism No
Open-ended			N/A	Leaving tab


Skill ratings

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Python3

Advanced


⚡⚡⚡



Data Structures

Beginner


⚡⚡⚡



Algorithms

Beginner

⚡⚡⚡



Scorecard

Algorithm skills

Code quality

Python3 skills

Record

★★★★★

★★★★★



★★★★★

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Challenge solutions

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Python3

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United States

Video 1

Python3

Week 4 Coding Quiz F

United States

Video 1

Python3

Multiple choice answers

1. Which of the following is NOT something that a hashmap does?

✓ max()
2. Which of the following is a benefit of using a hashmap over an array or linked list?

✓ O(1) average runtime for lookup and insert
3. Here is a hash function for integers. Which of the following pairs of keys would lead to hash collision if both were ins

```
def hash(int: n):  
    return n % 101
```

✓ 1 and 506
4. Why is a hashmap insert/get not O(1) runtime in the worst-case?

✓ Multiple keys can hash to the same bucket
5. Assume the following hash function for a hashmap of capacity 10

```
def hash(int: n):  
    return n % 10
```

Which of the following outputs is a possible array state with linear probing?

✓ [None, None, 2, 32, 13, 52, 64, 25, 45, None, None]
6. Which of the following best describes a hashmap collision?

✓ Two key-value pairs have different keys and hash to the same index.
7. Select the line of code that should replace CODE in the following block.

```
map = {}  
# Add some elements to map.  
  
# Goal to print all key, value pairs.  
for key in map.keys():  
    CODE
```



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```
return f(n // 2) + f(n // 2)
```

✓ Will run forever

9. What does this function do?

```
def f(n: int) -> int:
    if n == 1:
        return n
    return f(n-1) + f(n-1)
```

✗ Will run forever

10. What does this function do?

```
def f(n):
    if n == 0:
        return 0
    return f(n // 2) + f(n // 2) + n
```

Hint: Rather than solve this mathematically, think of other recurrence relations you know.

✗ Will run forever

11. Suppose we have an algorithm that finds the median of an unsorted array in $O(n)$ runtime in the worst case.

Consider a QuickSort implementation where we first find the median using the above algorithm, then use the median as the pivot. What will be the worst-case time complexity of this modified QuickSort?

Hint: Think about what input causes the worst-case of quicksort. How does this prevent those worst-cases from happening?

✓ $O(n \log n)$

12. What does it mean for a sorting algorithm to be stable?

✓ Maintains the relative ordering of keys with equal value.

13. Which of the following is not a stable sorting algorithm?

✓ Quicksort

14. What does it mean for a sorting algorithm to be in place?

✓ Uses constant extra space

15. Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with 7 as the pivot. The array looks like this:

```
[2, 5, 1, 7, 9, 12, 11]
```

Which of the following could not have been the pivot?



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Which of the following could be a possible array after one iteration of quicksort? Assume no shuffle.

✓ [A, C, I, C, E, P, R, T]

17. Which of the following sorting algorithms has the fastest worst-case time complexity?

✓ Mergesort

18. Which of the following is true about the below sorting algorithm?

```
def sort(arr):  
    N = len(arr)  
    for i in range(N):  
        for j in range(N-1, i, -1):  
            if arr[j] < arr[j-1]:  
                arr[j], arr[j-1] = arr[j-1], arr[j]
```

Which of the following is true about the above sorting algorithm?

✓ The sorting algorithm is in-place

19. Which of the following is true about the below sorting algorithm?

```
def sort(arr):  
    N = len(arr);  
    for i in range(N):  
        for j in range(N-1, i, -1):  
            if arr[j] < arr[j-1]:  
                arr[j], arr[j-1] = arr[j-1], arr[j]
```

Which of the following best describes the code above at the end of each outer 'i' loop? Select the most precise statement still true.

✓ Entries a[0] through a[i] are in sorted order and includes the smallest elements in the entire array.

20. What does the following code block print out?

```
my_string = 'good morning, world'  
res = []  
  
res.append(my_string.split())  
res.append(my_string.split(','))  
  
print(res)
```

✓ [['good', 'morning,', 'world'], ['good morning', ' world']]

21. Let's say you have started sorting the following array, but you are unsure what sorting algorithm is used.

```
start = [6, 1, 14, 10, 5, 12, 11, 9]
```

Your code crashed during the sorting process, but you had it print the current state of the sorting algorithm just before. The intermediate value of the start is printed below.

```
temp = [1, 5, 6, 10, 14, 12, 11, 9]
```

Which of the following sorting algorithms could have possibly been used to sort this array? In other words, which sort could have had an intermediate step of temp?

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And you begin sorting it with an unknown sorting algorithm, but your code crashes. You are left with the below interm

[20, 4, 10, 16, 31, 55, 31, 47, 120, 78]

Which sorting algorithm could it have been?

✔ Quicksort (Standard)

23. Suppose you have the following array

[100, 31, 55, 35, 31, 55, 31, 47, 12, 8]

And you begin sorting it with an unknown sorting algorithm, but your code crashes. You are left with the below interm

[31, 35, 55, 100, 31, 55, 31, 47, 12, 8]

Which sorting algorithm could it have been?

✖ Mergesort (Top-Down)

24. Suppose you have the following array

[100, 28, 31, 120, 31, 35, 93, 15, 23, 59, 55, 47]

And you begin sorting it with an unknown sorting algorithm, but your code crashes. You are left with the below interm

[28, 31, 31, 35, 100, 120, 15, 23, 93, 55, 59, 47]

Which sorting algorithm could it have been?

✔ Mergesort (Top-Down)

25. Suppose you have the following array

[120, 100, 47, 23, 31, 15, 47, 55, 28, 93]

And you begin sorting it with an unknown sorting algorithm, but your code crashes. You are left with the below interm

[15, 23, 28, 31, 100, 120, 59, 55, 47, 93]

Which sorting algorithm could it have been?

✖ Quicksort (Standard, no shuffle)

26. What is the output of the following code block?

```
l = [(1,2), (2,1), (1,3)]
l.sort()
print(l)
```

✔ [(1, 2), (1, 3), (2, 1)]



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✓ No, the class `Something` is completely/partially missing a comparison function.

28. Will this code work? Why or why not?

```
class Something:
    def __init__(self, x: int, y: int) -> None:
        self.x = x
        self.y = y

    def __lt__(self, other: Something):
        return self.x > other.x

l = [Something(1,2), Something(3,4), Something(5,6)]
l.sort()
```

✓ Yes.

29. Suppose we wanted to implement the following sorting algorithm called radix sort.

Group all the strings with the same first character i.e. all strings starting with 'a', 'b', 'c',.....

```
[words starting with 'a'], [words starting with 'b'], ,....
```

Then for each group, recursively call radix sort but on the next character to further group the lists. Repeat this process until the sublists are size 1.

What is the runtime of this sorting algorithm?

n = number of strings

k = average length of each string

✓ $O(nk)$ 30. If I'm sorting a string that contains only ASCII values (of which there are 128), and the length of the string is length, that string can be sorted in $O(n)$, not $O(n \log n)$. Am I correct?

✓ Yes, because ASCII only has a fixed number of values, allowing us to do a bucket sort.

31. What are the time complexities of the below code blocks, where n is the length of original?

(a)

```
original = 'coachable'
copy = ''

for c in original:
    copy += c
```

(b)

```
original = 'coachable'
copy = []

for c in original:
    copy.append(c)
''.join(copy)
```

✓ a: $O(n^2)$, b: $O(n)$



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33. Compute $f(64)$ for the following function.

```
def f(n: int) -> int:
    if n <= 4:
        return n
    return f(n // 2) + f(n // 4)
```

✓ 26

34. What does the following code block print out?

```
my_string = 'hello world'
print(' '.join(my_string.split()))
```

✓ hello,world

35. What is the runtime of

- (a) `list.pop()`
- (b) `list.remove(...)`
- (c) `list.insert(..., ...)`

where n is the length of the list?× a: $O(1)$, b: $O(n)$, c: $O(1)$

36. What does this code do?

```
def f(n: int) -> bool:
    if n < 0:
        return True
    if n < 3:
        return n == 0
    return f(n - 3) and f(n - 6)
```

✓ Returns True if n is divisible by 3, False otherwise

37. What does the below code print?

```
def f(m: int, n: int) -> int:
    if min(m, n) <= 1:
        return 0
    return f(m // 2, n - 1) * f(m - 1, n // 2) + m * n

print(f(5, 7))
```

✓ 179

38. Which of the following best describes an $O(\log n)$ relationship?

✓ 2x input -> +1 output

39. What does the following code block output?



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40. What does the following code block output?

```
class A:
    def __init__(self, x, y):
        self.x = x
        self.y = y

a = A(2, 3)
print(a)
```

✓ <FILENAME.A object at \$ADDRESS>

41. What will the following code block output?

```
class A:
    def __init__(self, x, y):
        self.x = x
        self.y = y

    def f(self, x):
        return x*2

a = A(2, 3)
print(a.f(5))
```

✓ 10

42. What will the following code block output?

```
class A:
    def __init__(self, x, y):
        self.x = x
        self.y = y

    def f(self, x):
        return x * 2

class B(A):
    def g(self, y):
        return self.f(y) + 4

b = B(2, 3)
print(b.g(5))
```

✓ 14

43. What is the runtime of the following stack operations?

(a) push(...)
(b) pop()

✓ a: O(1), b: O(1)

44. What is the runtime of the following queue operations?

(a) enqueue(...)



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```
a.append(7)
a.pop()
print(a.pop())
```

✓ 5

46. What is the output of the following code block?

```
arr = [(1,9), (4,4), (5,2), (4,3), (7,1)]
arr.sort(key = lambda x: x[0]*x[1])
print(arr)
```

What is this code doing?

✓ It takes the input list and sorts by the product of both elements in the tuple.

47. What is the error in the following Python implementation of binary search?

```
def binary_search(arr, target):
    left = 0
    right = len(arr)

    while left < right:
        mid = (left + right) // 2
        if arr[mid] == target:
            return mid
        elif arr[mid] < target:
            left = mid
        else:
            right = mid - 1

    return -1
```

✓ The left and right bounds are initialized incorrectly.

48. What is the output of the following Python code?

```
def flatten(lst):
    result = []
    for i in range(len(lst)):
        if type(lst[i]) == list:
            result += flatten(lst[i])
        else:
            result.append(lst[i])
    return result
```

```
print(flatten([1, [2, [3, 4], 5], 6]))
```

✓ [1, 2, 3, 4, 5, 6]

49. What is the output of the following Python code?

```
s1 = "hello"
s2 = "world"
s3 = s1 + " " + s2
s4 = s3.replace("o", "x", 2)
print(s4)
```



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