**View the sorting algorithm videos from** [**http://tinyurl.com/sortingvids**](http://tinyurl.com/sortingvids) **and answer the following questions. Submit via Slack by 3 April 2018.**

1. The list [4, 2, 5, 6, 7, 3, 1] is shown below after each pass of a sorting algorithm:

[1, 2, 5, 6, 7, 3, 4]   
[1, 2, 5, 6, 7, 3, 4]   
[1, 2, 3, 6, 7, 5, 4]  
[1, 2, 3, 4, 7, 5, 6]   
[1, 2, 3, 4, 5, 7, 6]   
[1, 2, 3, 4, 5, 6, 7]   
[1, 2, 3, 4, 5, 6, 7]   
  
Which sorting algorithm is being executed?   
(a) bubble sort   
(b) selection sort   
(c) insertion sort ( B )

2. The list [4, 2, 5, 6, 7, 3, 1] is shown below after each pass of a sorting algorithm:

[2, 4, 5, 6, 3, 1, 7]  
[2, 4, 5, 3, 1, 6, 7]  
[2, 4, 3, 1, 5, 6, 7]  
[2, 3, 1, 4, 5, 6, 7]  
[2, 1, 3, 4, 5, 6, 7]  
[1, 2, 3, 4, 5, 6, 7]

Which sorting algorithm is being executed?

(a) bubble sort  
(b) selection sort  
(c) insertion sort ( A )

3. The list [4, 2, 5, 6, 7, 3, 1] is shown below after each pass of a sorting algorithm:

[4, 2, 5, 6, 7, 3, 1]  
[2, 4, 5, 6, 7, 3, 1]  
[2, 4, 5, 6, 7, 3, 1]  
[2, 4, 5, 6, 7, 3, 1]  
[2, 4, 5, 6, 7, 3, 1]  
[2, 3, 4, 5, 6, 7, 1]  
[1, 2, 3, 4, 5, 6, 7]

Which sorting algorithm is being executed?

(a) bubble sort  
(b) selection sort  
(c) insertion sort ( C )

4. List [8, 2, 8, 7, 3, 1, 2] is being sorted using bubble sort. Fill in the blanks to show the list after each pass.   
  
After the 1st pass: [2, 8, 7, 3, 1, 2, 8]   
After the 2nd pass: [2, 7, 3, 1, 2, 8, 8]   
After the 3rd pass: [2, 3, 1, 2, 7, 8, 8]   
After the 4th pass: [2, 1, 2, 3, 7, 8, 8]  
After the 5th pass: [1, 2, 2, 3, 7, 8, 8]  
After the 6th pass: [1, 2, 2, 3, 7, 8, 8]

5. List [1, 5, 8, 7, 6, 1, 7] is being sorted using selection sort. Fill in the blanks to show the list after each pass.   
  
After the 1st pass: [1, 5, 8, 7, 6, 1, 7]   
After the 2nd pass: [1, 1, 8, 7, 6, 5, 7]   
After the 3rd pass: [1, 1, 5, 7, 6, 8, 7]   
After the 4th pass: [1, 1, 5, 6, 7, 8, 7]  
After the 5th pass: [1, 1, 5, 6, 7, 8, 7]  
After the 6th pass: [1, 1, 5, 6, 7, 7, 8]

6. List [6, 8, 2, 1, 1, 9, 4] is being sorted using insertion sort. Fill in the blanks to show the list after each pass.   
After the 1st pass: [6, 8, 2, 1, 1, 9, 4]   
After the 2nd pass: [6, 8, 2, 1, 1, 9, 4]   
After the 3rd pass: [2, 6, 8, 1, 1, 9, 4]   
After the 4th pass: [1, 2, 6, 8, 1, 9, 4]  
After the 5th pass: [1, 1, 2, 6, 8, 9, 4]  
After the 6th pass: [1, 1, 2, 6, 8, 9, 4]  
After the 7th pass: [1, 1, 2, 4, 6, 8, 9]

7. Show how mergesort sorts the list [3,2,1,4,13,10,12,15,9,6,11,7,5,14,8,16] after each pass.

0: [3,2,1,4,13,10,12,15,9,6,11,7,5,14,8,16]

1: [3,2,1,4,13,10,12,15] + [9,6,11,7,5,14,8,16]

2: [3,2,1,4] + [13,10,12,15] + [9,6,11,7] + [5,14,8,16]

3: [3, 2] + [1, 4] + [13, 10] + [12, 15] + [9, 6] + [11, 7] + [5, 14] + [8, 16]

4: [2, 3] + [1, 4] + [10, 13] + [12, 15] + [6, 9] + [7, 11] + [5, 14] + [8, 16]

5: [1, 2, 3, 4] + [10, 12, 13, 15] + [6, 7, 9, 11] + [5, 8, 14, 16]

6: [1, 2, 3, 4, 10, 12, 13, 15] + [5, 6, 7, 8, 9, 11, 14, 16]

7: **[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]**

8. Show how quicksort sorts list [3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5] using first element of each sublist as the pivot.

0: [3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5]

1: [1, 1, 2, 3] + **[3]** + [4, 5, 9, 6, 5, 5]

2: [1] + **[1]** + [2, 3] + **[3]** + **[4]** + [5, 9, 6, 5, 5]

3: **[1]** + **[1]** + **[2]** + [3] + **[3]** + **[4]** + [5, 5] + **[5]** + [9, 6]

4: **[1]** + **[1]** + **[2]** + **[3]** + **[3]** + **[4]** + [5] + **[5]** + **[5]** + [6] + **[9]**

= **[1, 1, 2, 3, 3, 4, 5, 5, 5, 6, 9]**

9. Simulate the heapsort algorithm on the following list [9,3,2,4,5,7,8,6,1,0] to sort it in descending order. Show how the initial heap is built, and subsequently sorted.

0: [9,3,2,4,5,7,8,6,1,0]

1: [9] + [3, 2] + [4, 5, 7, 8] + [6, 1, 0]

2: [9] + [3, 2] + [4, 5, 7, 8] + [6, 1, 0]

5: [9] + [3, 2] + [6, 5, 7, 8] + [4, 1, 0]

6: [9] + [3, 8] + [6, 5, 7, 2] + [4, 1, 0]

8: [9] + [5, 8] + [6, 3, 7, 2] + [4, 1, 0]

9: [9] + [6, 8] + [5, 3, 7, 2] + [4, 1, 0]

Heap is built.