CS 5343.001 - Algorithm Analysis and Data Structures - F20   Course Homepage

Review Test Submission: CS5343_Fall20_Exam2

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Course	CS 5343.001 - Algorithm Analysis and Data Structures - F20
Test	CS5343_Fall20_Exam2
Started	11/25/20 1:02 PM
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Due Date	11/26/20 2:00 AM
Status	Completed
Attempt Score	100 out of 100 points
Time Elapsed	42 minutes out of 1 hour and 20 minutes
Results Displayed	All Answers, Correct Answers, Feedback

Question 1   10 out of 10 points

Match with the appropriate algorithm or data structure:

Question		Correct Match
Find articulation points	✅	E. Depth First Search
Determine if a cycle exists	✅	B. Disjoint Set
Get smallest item next	✅	A. Priority Queue
Find the kth item of a list in linear average time	✅	D. Quick select
Find a minimum spanning tree	✅	C. Prim's algorithm

All Answer Choices

A. Priority Queue

B. Disjoint Set

C. Prim's algorithm

D. Quick select

E. Depth First Search

Question 2

10 out of 10 points

Match with the appropriate algorithm or data structure:

Question	Correct Match
Binary heap deleteMin	✅ A. O(log N)
Binary heap "buildheap"	✅ B. O(N)
Leftist heap deleteMin	✅ A. O(log N)
Leftist heap merge	✅ A. O(log N)
Binomial queue deleteMin	✅ A. O(log N)

All Answer Choices

A. O(log N)

B. O(N)

Question 3

5 out of 5 points

Suppose 42, 11, 28, 8, 13, 61 are inserted in the order given into an empty binary heap. Where will 61 be?

Answers: Right of 8

✅ Left of 28

Right of 28

Left of 11

Right of 11

Question 4

5 out of 5 points

Suppose one leftist heap has 4 at the root, left child 10, right child 50, and another leftist heap has 8 at the root, left child 12, right child 19. After a merge, where is 10?

Answers: ✅ Right of 4

Left of 4

Right of 8

Left of 8

Left of 12

Question 5

5 out of 5 points

Suppose the same two trees from the previous question are treated as Skew heaps and merged. After a merge, where is 19?

Answers: Right of 4

Left of 4

Right of 8

✅ Left of 8

Left of 12

Question 6

10 out of 10 points

Match on worst-case running time:

Question		Correct Match
Insertion sort	✅	B. O(N^2)
Shell sort with Shell's increments	✅	B. O(N^2)
Heap sort	✅	A. O(N log N)
Merge sort	✅	A. O(N log N)
Quick sort	✅	B. O(N^2)

All Answer Choices

A. O(N log N)

B. O(N^2)

Question 7

5 out of 5 points

Suppose merge sort is used to sort this list: 64, 32, 79, 83, 67, 46, 96, 55. In the last merge step, when two groups of 4 are merged, what values will be at the start of each group?

Answers: 79 and 96

79 and 55

64 and 67

83 and 96

32 and 46

✓

Question 8

5 out of 5 points

Performing a median-of-three pivot selection on 64, 32, 79, 83, 67, 46, 96, 55 results in what being selected as the pivot?

Answers: 55

✓   64

67

79

96

Question 9

5 out of 5 points

For 79, 83, 46, 67, 96, 55, 68, 12, which would be the list if 67 is randomly chosen to be the pivot and partitioning is performed until i and j meet or cross?

Answers: 46, 55, 12, 67, 96, 83, 68, 79

12, 55, 46, 67, 83, 96, 68, 79

55, 46, 12, 67, 68, 79, 96, 83

12, 46, 55, 67, 68, 79, 83, 96

55, 12, 46, 67, 96, 79, 68, 83

✓

Question 10

5 out of 5 points

A disjoint set's array is shown below. What does it represent?

```
_____
|  −2  |   0   |  4  |   2  |  −3  |  4  |  4  |
   0       1      2      3      4      5     6
```

Answers: Two trees, one of size 1, one of size 2.

Two trees, one of size 2, one of size 3.

Two trees, one of size 3, one of size 4.

Two trees, one of height 2, one of height 3.

✅ Two trees, one of height 1, one of height 2.

Question 11

5 out of 5 points

A disjoint set object has two trees, one having 5 nodes with value 3 at the root, and another having 3 nodes with value 5 at the root. If a union by size is performed, what is the value of the root?

Answers: ✅ 3

5

Question 12

5 out of 5 points

A node with value 5 has two children whose values are 8 and 10. The node with value 5 has 4 ancestors with node values of 4, 3, 2, 1, where 1 is the root. A find on value 5 is performed using path compression. Which nodes have a different parent than before?

Answers: All of the nodes below the root.

Nodes with values 5, 4, 3, 2, 8, 10.

Nodes with values 4, 3, 2.

✅ Nodes with values 5, 4, 3.

Only the node with value 5.

Question 13

5 out of 5 points

For the graph given by the adjacency list, what are the shortest distances to each vertex?

v1 v2-2, v4-1
v2 v4-3, v5-10
v3 v1-4, v6-5
v4 v3-2, v5-2, v6-8, v7-4
v5 v7-6
v6
v7 v6-1

v1-0, v2-2, v3-2, v4-1, v5-2, v6-1, v7-4

v1-0, v2-2, v3-3, v4-1, v5-3, v6-9, v7-5

✓ v1-0, v2-2, v3-3, v4-1, v5-3, v6-6, v7-5

v1-0, v2-3, v3-3, v4-1, v5-3, v6-6, v7-5

v1-0, v2-2, v3-3, v4-1, v5-12, v6-6, v7-5

Question 14

5 out of 5 points

For the graph given by the adjacency list, which does NOT represent a topological sort?

v1 v2, v3
v2 v4, v5
v3
v4 v6, v7
v5
v6
v7

Answers: v1 v2 v3 v4 v5 v6 v7

v1 v3 v2 v4 v5 v6 v7

v1 v2 v4 v6 v7 v5 v3

✓ v1 v4 v5 v2 v3 v6 v7

v1 v2 v3 v4 v6 v7 v5

Question 15

5 out of 5 points

For the graph given by the adjacency list, which represents a breadth-first search?

v1 v2, v3
v2 v4, v5
v3
v4 v6, v7
v5
v6
v7

Answers: ✓ v1 v2 v3 v4 v5 v6 v7

v1 v2 v4 v5 v6 v7 v3

v1 v2 v4 v6 v7 v5 v3

Question 16

5 out of 5 points

For the graph given by the adjacency list, which represents a depth-first search?

v1 v2, v3
v2 v4, v5
v3
v4 v6, v7
v5
v6
v7

Answers: v1 v2 v3 v4 v5 v6 v7

              v1 v2 v4 v5 v6 v7 v3

               v1 v2 v4 v6 v7 v5 v3
         ✅

Question 17

5 out of 5 points

For a graph to have an Euler circuit, it must have:

Answers: All vertices with odd degree

         ✅   All vertices with even degree

              Two vertices with odd degree

              Two vertices with even degree

              An even number of edges

← **OK**