CSPB 3104 - Park - Algorithms

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Started on	Friday, 2 February 2024, 10:24 PM
State	Finished
Completed on	Friday, 2 February 2024, 10:30 PM
Time taken	6 mins 35 secs
Marks	4.00/4.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 2.00 out of 2.00

Select all arrays that are valid min-heaps from the list below. Make sure that every selected array is in fact a valid heap.

Assume that the arrays are written out as [a[1], a[2],...,a[n]], n being the length.

Select one or more:

- ☑ a. [3,4,5,4,5,7,8,8,5]
- ☑ b. [1,3,5,7,9,11,13]
- ☐ c. [10,3,1,4,6,1,7,8,19]
- ☑ d. [1,3,10,4,6,16,17,12,15]
- ☐ e. [1,2,3,4,3,2.5,5]

Your answer is correct.

The correct answers are: [1,3,10,4,6,16,17,12,15], [1,3,5,7,9,11,13], [3,4,5,4,5,7,8,8,5]

[Correct]

Marks for this submission: 2.00/2.00.

Question **2**

Correct

Mark 1.00 out of 1.00

Match each of the given operations against the correct worst-case complexity for a min heap data structure.

Finding the minimum key in the heap of size n	$$\Theta(1)$$
Decrease the minimum key in the min heap by 1 (heap of size n)	$$\Theta(1)$$
Finding the **maximum** key in the min heap of size n	$$\Theta(n)$$
Checking whether a given array of size n is a min heap.	$$\Theta(n)$$
Find if a given key exists in a heap of size n	$$\Theta(n)$$
Deleting a key from the heap of size n	$$\Theta(\log(n))$$
Inserting a new key into a heap of size n	$$\Theta(\log(n))$$
Finding the third smallest element in the heap of size n	$$\Theta(1)$$
Increase the minimum key in the heap by some number d (heap of size n)	$$\Theta(\log(n))$$

Your answer is correct.

The correct answer is: Finding the minimum key in the heap of size n → $$\Theta(1)$$, Decrease the minimum key in the min heap by 1 (heap of size n)
→ $$\Theta(1)$$, Finding the **maximum** key in the min heap of size n → $$\Theta(n)$$, Checking whether a given array of size n is a min heap. → $$\Theta(n)$$, Find if a given key exists in a heap of size n → $$\Theta(n)$$, Deleting a key from the heap of size n → $$\Theta(\log(n))$$, Inserting a new key into a heap of size n → $$\Theta(\log(n))$$, Finding the third smallest element in the heap of size n → $$\Theta(1)$$, Increase the minimum key in the heap by some number d (heap of size n)
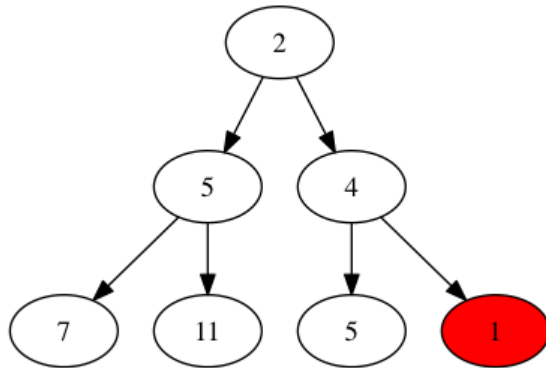→ $$\Theta(\log(n))$$

Correct

Marks for this submission: 1.00/1.00.
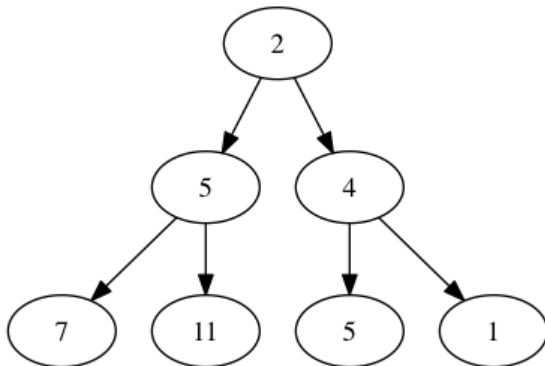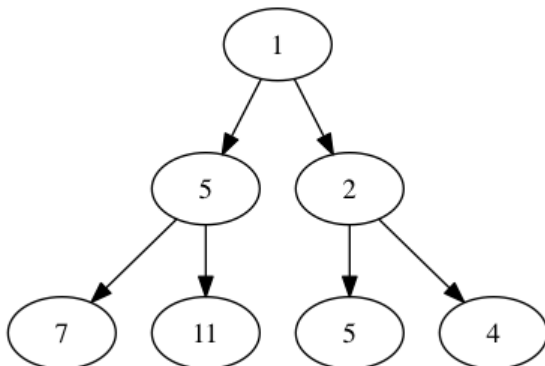
Question **3**
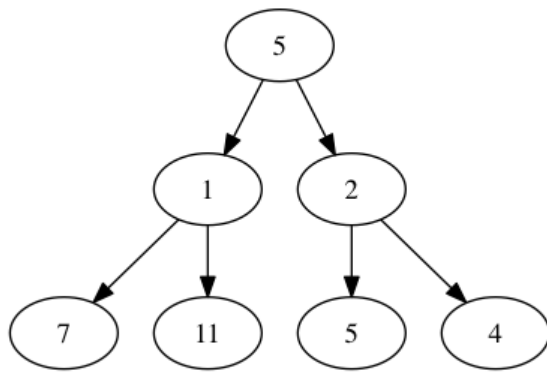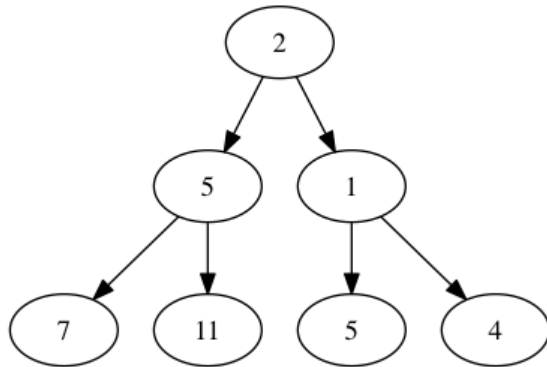
Correct

Mark 1.00 out of 1.00

Consider the heap below where node labelled "1" is shown in red has just been inserted.

Choose the final heap that is obtained after the newly inserted node is "bubbled up" to its final position.
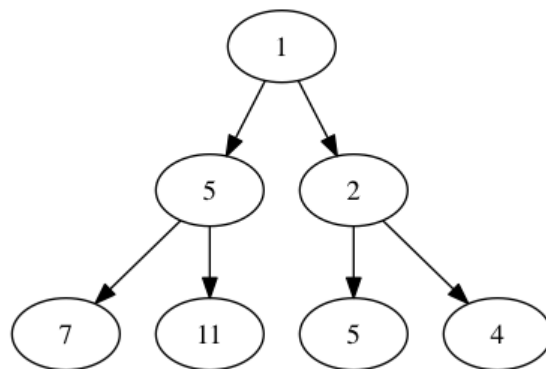
Select one:

○ a.

◉ b.

c.

d.

Your answer is correct.

The correct answer is:

Correct
Marks for this submission: 1.00/1.00.