

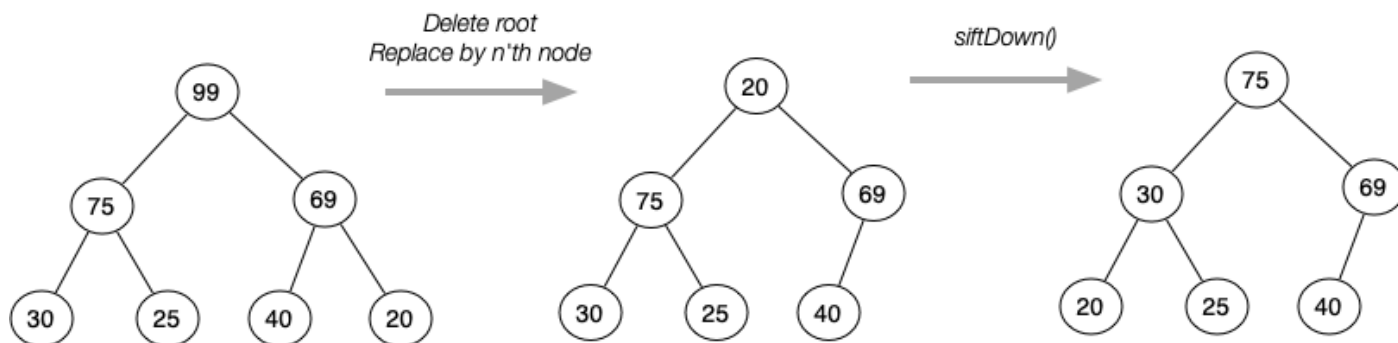
# COMP2521 Data Structures & Algorithms Final Exam

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## Question 7 (4 marks)

Heaps can be viewed as top-to-bottom ordered trees and implemented as arrays. When a heap is used to implement a priority queue, the root node is always removed to implement the "leave queue" operation. The root node is replaced by the bottom-most, right-most node. The heap property is then restored using the `siftDown()` operation, which pushes the root node down the tree until it reaches its appropriate position.

The following diagram shows this remove-replace-siftDown process:



As an array, the above initial heap looks like the following:

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
heap	99	75	69	30	25	40	20	-	-

Show all of the states of the array as it undergoes remove-replace-siftDown. Show all of the intermediate states in `siftDown()`.

### Instructions:

- Type your answer to this question into the file called `q7.txt`
- Submit via: **give cs2521 exam\_q7 q7.txt**  
or via: Webcms3 > exams > Final Exam > Submit Q7 > Make Submission

*End of Question*