PA 7 Part 1: Heap Worksheet

DSC 30 Fall 2021

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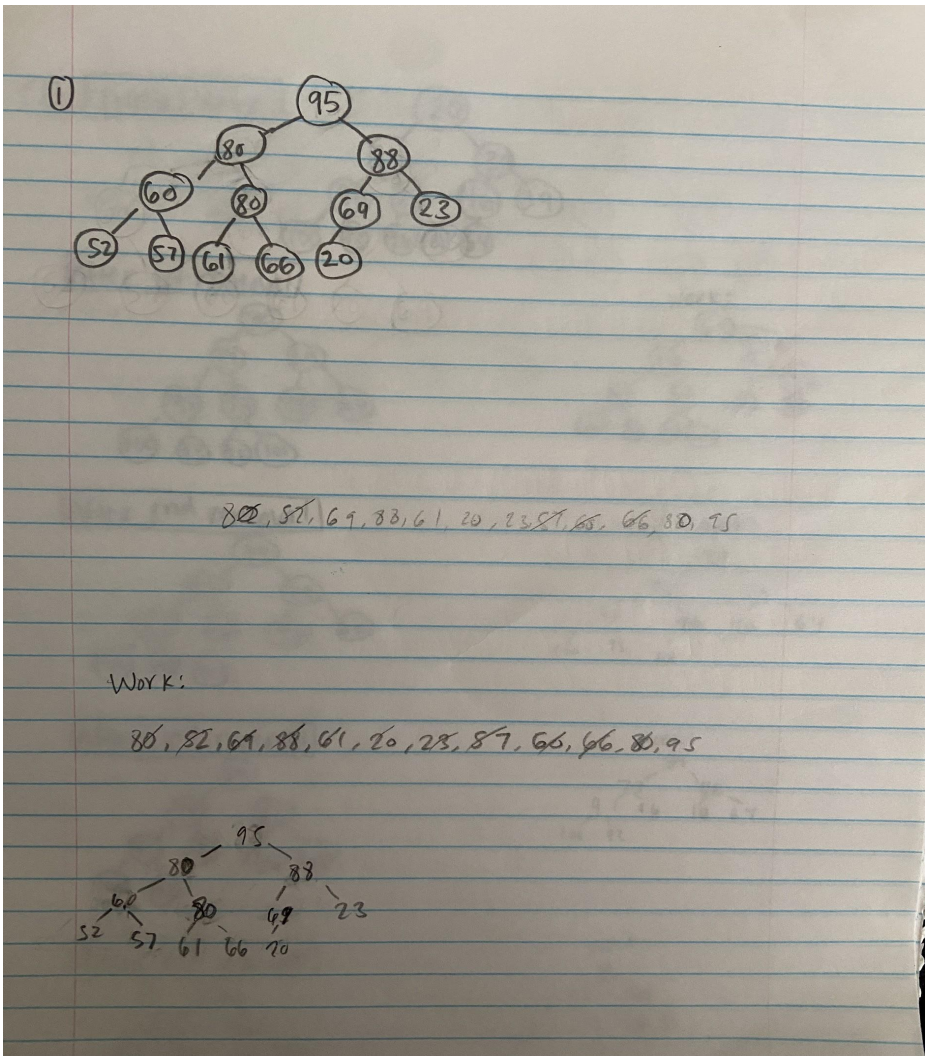
1. Insert the following elements in the given order to an empty **binary (d = 2) max-heap**. Draw the tree representation of the heap after all insertions.

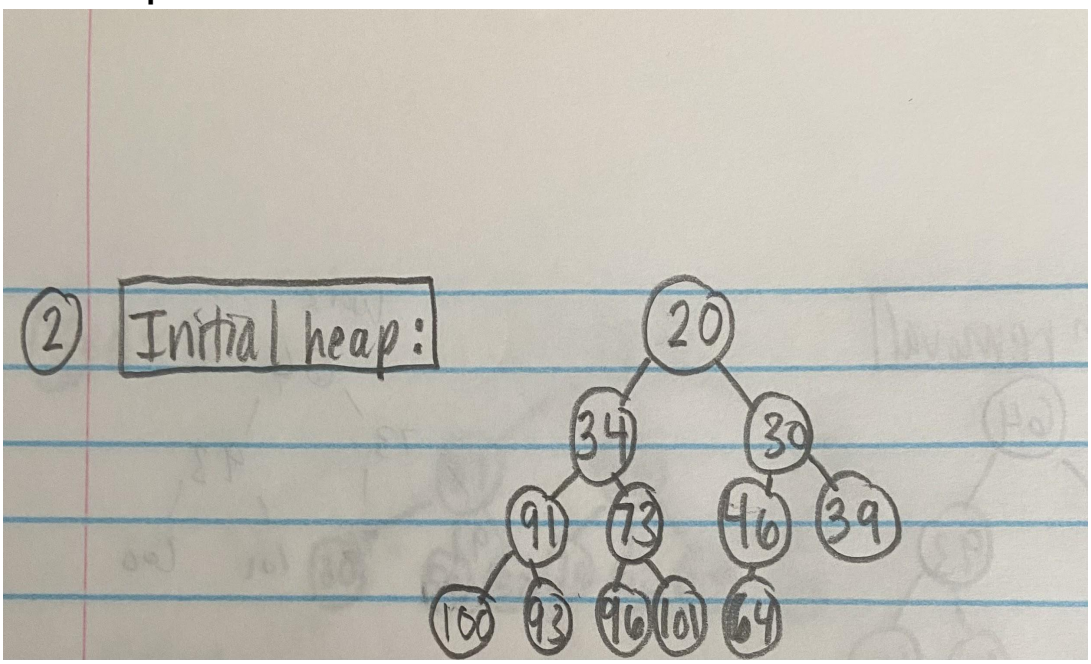
   Elements to insert: [80, 52, 69, 88, 61, 20, 23, 57, 60, 66, 80, 95]



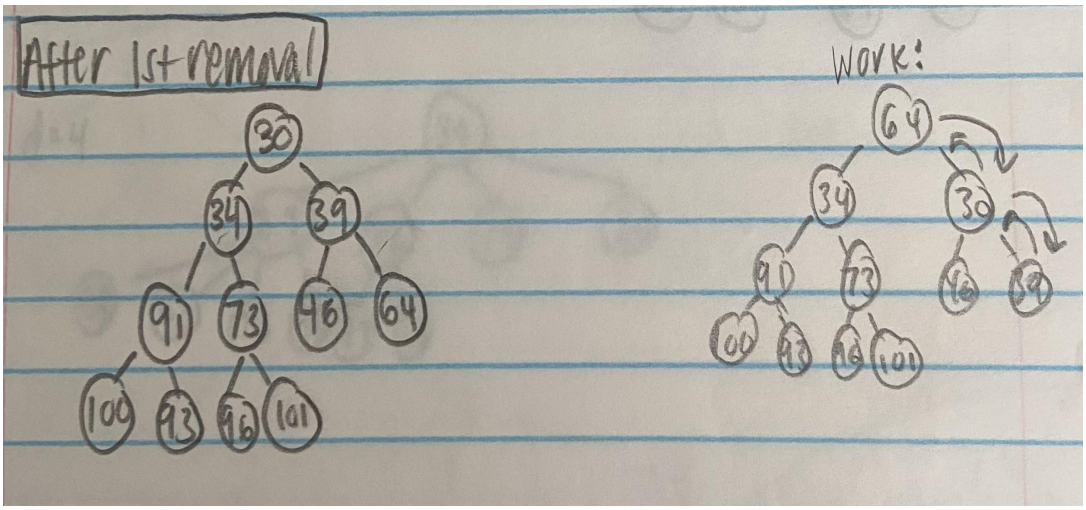
2. Remove the top element 5 times from the given **binary min-heap** and draw the tree representations of the initial heap and the heap after **each** removal.

   Array representation of the initial heap:
   [20, 34, 30, 91, 73, 46, 39, 100, 93, 96, 101, 64]

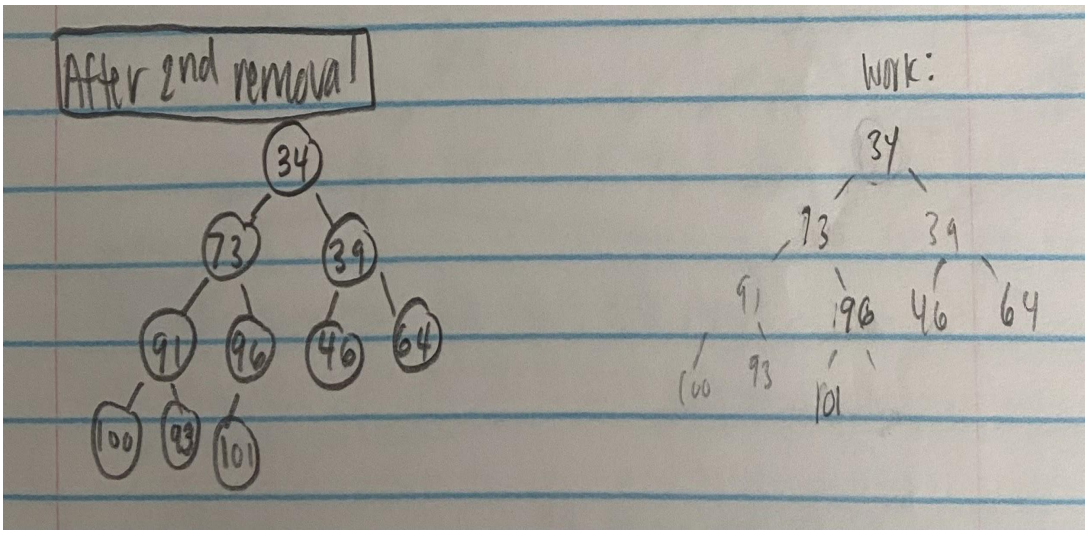
Initial heap



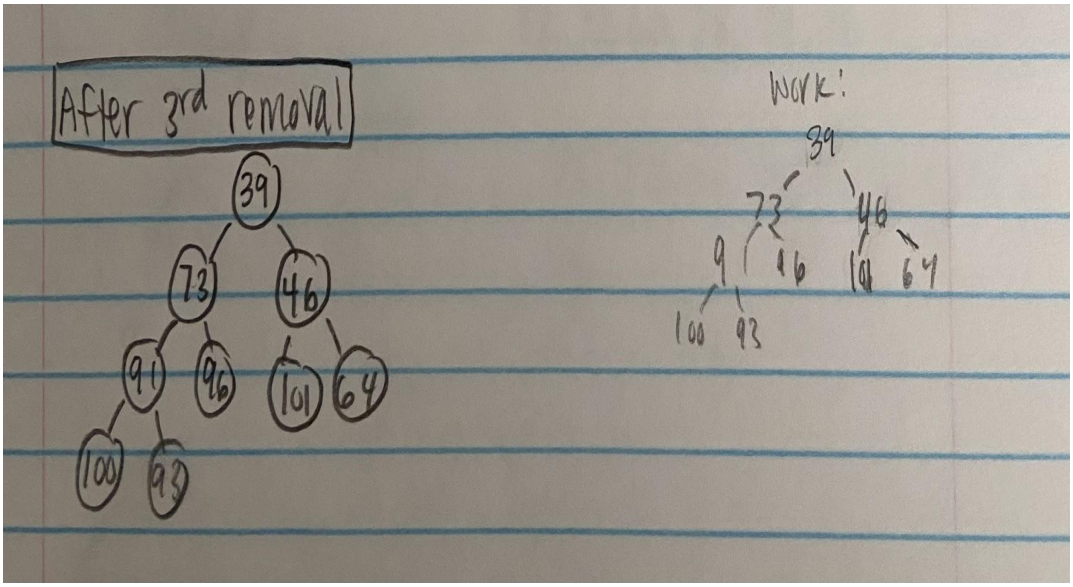
After 1st removal



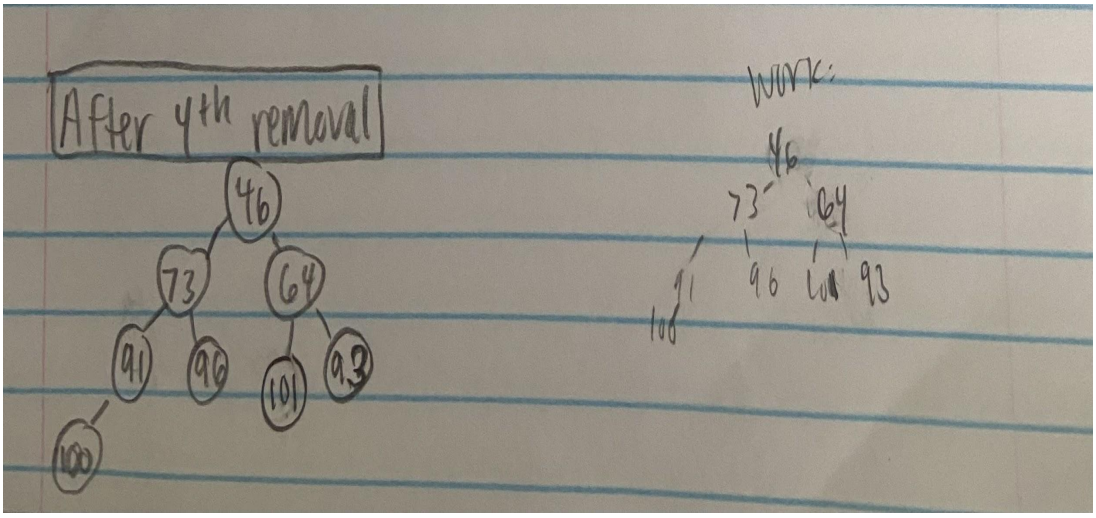
After 2nd removal



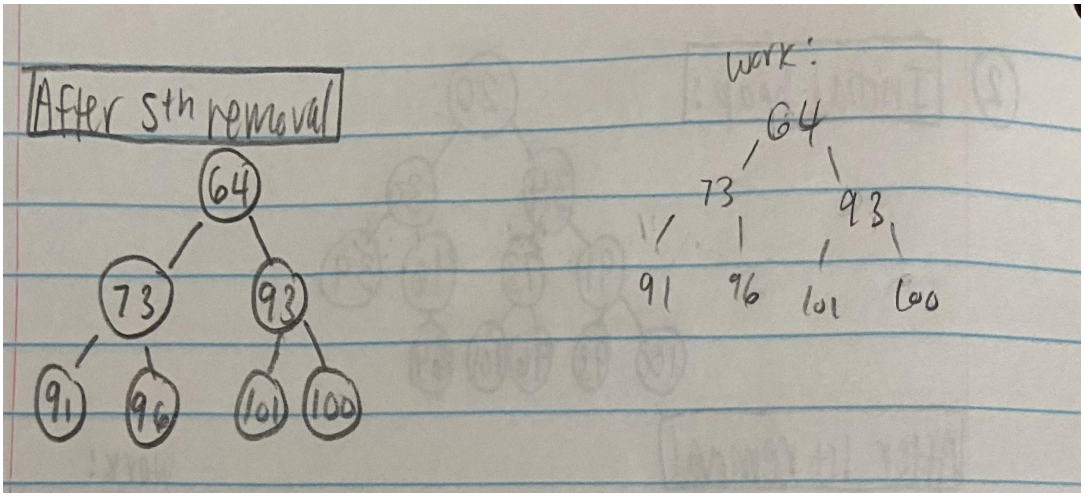
After 3rd removal



After 4th removal



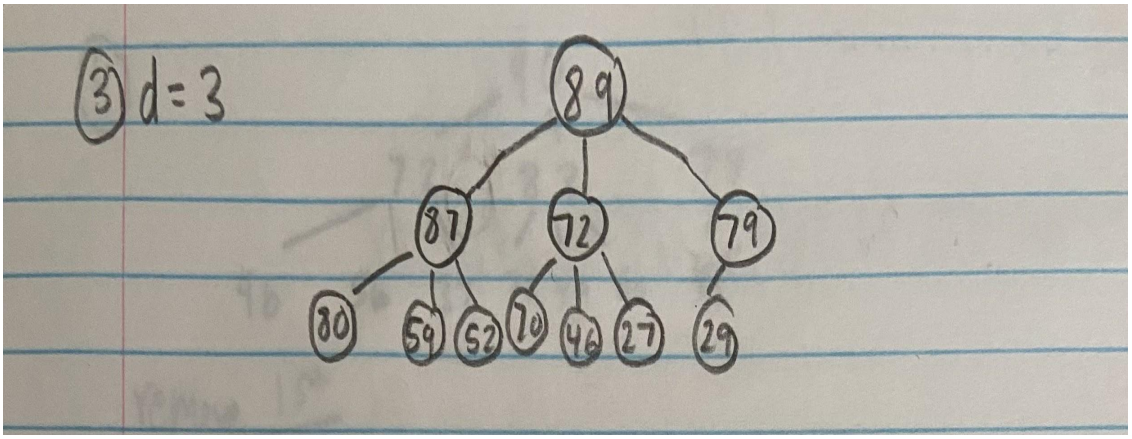
After 5th removal



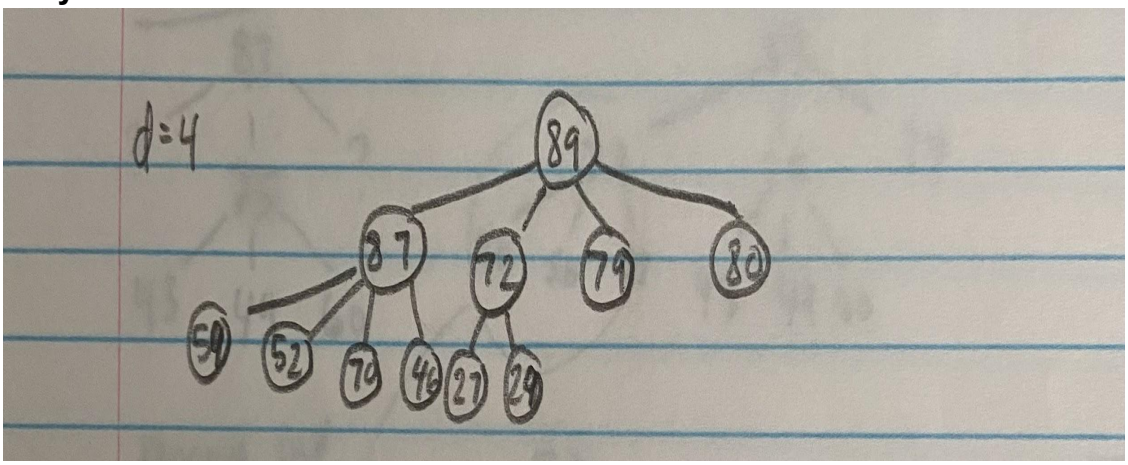
3. Draw the tree representations of the d-ary max-heaps from the following array representation. Choose d = {3, 4}.

   Array representation: [89, 87, 72, 79, 80, 59, 52, 70, 46, 27, 29]

3-ary



4-ary



4. Write down the array representations of the given **3-ary max-heap** after each specified operation. Note that each operation should be performed on the result of the previous operation.

Original											
90	72	83	74	46	56	37	75	49	60	43	
After **removing the top twice**											
75	72	60	74	46	56	37	43	49			
After **inserting 28 and 92**											
92	72	60	75	46	56	37	43	49	28	74	
After **removing the top once**											
75	72	60	74	46	56	37	43	49	28		
After **inserting 79 and 74**											
79	72	60	75	46	56	37	43	49	28	74	74
After **removing the top 10 times**											
37	28										