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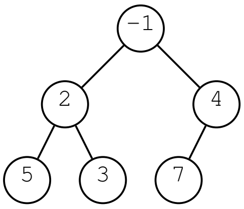
Datenstrukturen & Algorithmen Programming Exercise 3 FS 13

In this exercise we will implement a binary *min-heap* using an array. The following operations should be supported:

- `Insert`(v) inserts the element v into the heap and restores the heap property.
- `Extract-Min` extracts the minimum from the heap and returns it.
- `Query-Last` returns the element that is stored in the last position of the array representing the heap.

If, e.g., the numbers $4, 5, 2, 3, -1, 7$ are inserted (in this order) into an initially empty heap, then we obtain the following heap:



This heap is represented by the array $-1, 2, 4, 5, 3, 7$. Therefore, the `Query-Last` operation returns `7` for the above heap.

Input The first line of the input contains only the number t of test instaces. After that, we have exactly one line for each test instance containing the numbers $n, v_1, v_2, ..., v_n$. While $n \in \mathbb{N}$, $1 \leq n \leq 1000$ describes the number of following integers, $v_i \in \mathbb{Z}$, $-1000 \leq v_i \leq 1000$ is the next element to be inserted. Every test instance starts with an empty heap, and the operations `Insert`(v_1), `Query-Last`, `Insert`(v_2), `Query-Last`, ..., `Insert`(v_n), `Query-Last` are executed in exactly that order.

Output For every test instace, we want to output two lines. The first one contains the output of all n `Query-Last` operations. The second one contains the output of n succeeding `Extract-Min` operations. This especially means that the first `Extract-Min` operation is performed *after* all `Query-Last` operations were executed.

Example

Input:

```
2
3 1 2 3
5 5 7 3 4 2
```

Output:

```
1 2 3
1 2 3
5 7 5 7 4
2 3 4 5 7
```

Hand-in: until Wednesday, 13th March 2013.