Heaps

a) (2.5 Points). **i) (1 Point)**. Suppose we have the min-heap below (represented as an array) with **distinct** elements, where the values of A and B are unknown. Note that A and B aren't necessarily integers.

```
{1, A, 3, 5, 9, 11, 13, 10, B}
```

What can we say about the relationships between the following elements? Put $>$, $<$, or `?` if the answer is not known.

A ◯ > ◯ < ◯ ? 1

A ◯ > ◯ < ◯ ? 3

B ◯ > ◯ < ◯ ? 10

A ◯ > ◯ < ◯ ? B

ii) (1.5 Points). Note for both parts below, the values of `A` and `B` should **not** violate the min-heap properties. Put `-inf` or `inf` if there isn't a lower or upper bound, respectively. If the bound for `B` depends on the value of `A`, or vice versa, you may put the variable in the bound, e.g. `A` $<$ `B`.

Considering **one `removeMin`** call, put **tight** bounds on `A` and `B` such that:

- We perform the **maximum** number of swaps.

  ------ $<$ **`A`** $<$ ------

  ------ $<$ **`B`** $<$ ------

- We perform the **minimum** number of swaps.

  ------ $<$ **`A`** $<$ ------

  ------ $<$ **`B`** $<$ ------