Bucket queue

A *bucket queue* (or a bucket queue) is a data structure, inspired from *bucket sort*, and can be used as a *priority queue*.

In a bucket queue, items can be added with a priority between 0 and $N - 1$, where N is a positive integer determined when the queue is created. A call to `RemoveMin` should remove and return an element with the lowest possible priority; if there are several elements with the same priority, it does not matter which element is removed and returned.

(a) Explain *briefly* which data structure is well suited for a bucket queue.

(b) Give an algorithm for `Insert` for a bucket queue.

```
Input: A bucket queue Q with priorities from 0 to N − 1, and an element x with priority p
Output: Q with x inserted with priority p
1 Procedure Insert(Q, x, p)
  |  // ···
```

(c) Give an algorithm `RemoveMin` for a bucket queue. You can assume that the queue is not empty.

```
Input: A bucket queue Q with priorities from 0 to N − 1
Output: A x with the lowest possible priority, which is removed from Q
1 Procedure RemoveMin(Q)
  |  // ···
```

(d) Assume that $N = 100$. Specify the runtime complexity of `Insert` and `RemoveMin` for a queue of n elements.