Problem Set 1

No Collaboration

1. A max-stack supports the following operations on a stack of real numbers, initially empty.

   - push(x): Push x onto the top of the stack
   - pop: Delete the top element on the stack
   - max: Return the maximum element on the stack

   Give an implementation of a max-stack for which the time per operation is \(O(1)\) worst-case.

2. A max-queue supports the following operations on a queue of real numbers, initially empty.

   - inject(x): Push x on the bottom of the queue
   - pop: Delete the top element from the queue
   - max: Return the maximum element on the queue

   Give an implementation of a max-queue for which the time per operation is \(O(1)\), amortized.

3. (extra credit). Give an implementation for a max-queue for which the time per operation is \(O(1)\) worst-case.